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WASTE DISPOSAL INC.
SUPERFUND SITE
Project Coordinator

March 1, 1999 Project No. 94-256

Ms. Andria Benner
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Transmittal
Technical Memorandum No. 9A
Soil Vapor Extraction Testing
Report of Findings
Waste Disposal, Inc. Superfund Site

Dear Ms. Benner:

Enclosed is a copy of Technical Memorandum (TM) No. 9A - Soil Vapor Extraction Testing, Report of Findings (ROF) for the Waste Disposal, Inc. (WDI) Superfund Site located in Santa Fe Springs, California. The submittal of this ROF is consistent with the timetable discussed in our January 1999 telephone conversation.

For your convenience Appendices A through H of the ROF are currently being transferred to CD-ROM and will be submitted to EPA under a separate cover by March 15, 1999. This submittal will consist of the following:

- Appendix A: Boring Logs and Well Construction Diagrams
- Appendix B: Laboratory Data
- Appendix C: Zone of Influence Calculations
- Appendix D: Intrinsic Permeability Calculations
- Appendix E: Summary of Gassolve Modeling Results
- Appendix F: Detailed Gassolve Modeling Results
- Appendix G: Site Gas Generation Calculations
- Appendix H: Destruction Efficiency Calculations

Please feel free to call me with any questions or comments at (562) 692-4535.

Sincerely,

Ian Webster
WDIG Project Coordinator

IW/EA:rm
Enclosure

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2022464

TECHNICAL MEMORANDUM NO. 9A SOIL VAPOR EXTRACTION TESTING REPORT OF FINDINGS

WASTE DISPOSAL, INC. SUPERFUND SITE SANTA FE SPRINGS, CALIFORNIA

Prepared for

United States Environmental Protection Agency

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March 1999

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EXECUTIVE SUMMARY

1. The purpose of Technical Memorandum (TM) No. 9A treatability study was to develop site-specific data on soil vapor extraction, and to evaluate its feasibility as a remedial alternative for the control of soil gas in selected areas of the WDI site. This Report of Findings has been prepared with the following objectives:
   - Determine air conductivity in two site layers (i.e., fill and native material).
   - Estimate the SVE radius of influence in each layer tested.
   - Evaluate posttreatment rebound of soil gas concentrations.
   - Evaluate air handling and treatment effectiveness.
   - Evaluation of global applicability of SVE as a WDI Technology for FS purposes.

2. During TM No. 9A activities SVE studies were completed in five selected areas of the site, including Area 5 (Brothers Machine Shop), Area 2 (C&E Die), Area 7, Area 8, and Area 2 (RV Storage Lot) as shown in Figure 2.1. Soil gases containing methane (CH_4), benzene (Bz), vinyl chloride (VC) and other hydrocarbons were extracted from the fill material (i.e., shallow soils above the sump-like materials) and from the native material (i.e., deep soils below the sump-like material) to below the current Interim Action Levels (IALs). Soil gas rebound after completion of SVE treatment indicated oxygen (O_2) utilization and carbon dioxide (CO_2) production consistent with biodegradation of petroleum hydrocarbons. Posttreatment CH_4 and volatile organic compound (VOC) levels increased slightly above the initial levels in a limited portion of Area 5 during the three months of rebound SVE monitoring. In the remaining areas, CH_4 and VOC rebound was observed to be minimal (i.e., below IALs).

3. Based on the data collected during TM No. 9A activities, the following findings are reported:
   - Site gas generation (i.e., rebound) was very low which is consistent with the gas generation levels previously theoretically determined in the February 1998 gas generation calculations submitted to EPA.
   - TM No. 9A rebound data confirms that the site was a low overall gas generation potential, which is incapable of generating sufficient gas to facilitate upward migration of gases into onsite business or laterally away from the site.
   - SVE was shown to be effective in reducing soil gas levels in the selected areas.
   - Soil gas extraction removed a relatively small mass of contaminants, (i.e., pounds [lbs]) as compared to typical landfill or gas station remediation which can generate tons of material.

- Very low levels of soil gases were extracted from the shallow fill soils adjacent to buildings, indicating that the fill soils are not a significant potential source of emissions to onsite business.
- In the deep soils, SVE reduced the soil gas levels significantly, and created a large zone of influence which appears to have temporarily enhanced aerobic biodegradation of the petroleum hydrocarbons.

4. SVE has been shown to be technically feasible for the control of soil gases in the areas outside the reservoir area. Furthermore and most importantly from a remedy selection perspective, SVE data also indicates that a passive technology, such as bioventing, may also be feasible for gas control at the site. The data collected during TM No. 9A will be used during the Feasibility Study (FS) to further reevaluate the control of soils gas in selected areas at the WDI site.

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1.0 INTRODUCTION

1. This Report of Findings (ROF) has been prepared to summarize the field and analytical data to evaluate soil vapor extraction (SVE) technology at the Waste Disposal, Inc. (WDI) Superfund site located in Santa Fe Springs, California. The scope of work was performed as outlined in Technical Memorandum (TM) No. 9A - Soil Vapor Extraction Testing (Rev. 2.0) dated April 14, 1998. TM No. 9A (Rev. 2.0) activities were approved by the United States Environmental Protection Agency (EPA) in June 1998.

2. The purpose of TM No. 9A activities was to develop additional field data on various soil gas parameters, including gas generation rates and gas conductivity, in designated areas which have shown elevated methane and volatile organic compound (VOC) concentrations. TM No. 9A activities were performed in two phases. Phase I consisted of active SVE treatment at five designated areas of the site. Phase II consisted of gas recovery monitoring which was initiated immediately following the Phase I activities.

3. The objectives of the SVE testing were to determine the following site-specific parameters at each of the five test locations:
   - Air conductivity in each layer adjacent to the gas-producing, sump-like material layer.
   - SVE radius of influence.
   - Flow versus vacuum ratios.
   - Long-term soil gas concentrations, including rebound.
   - Condensate production.
   - Vapor extraction system and treatment effectiveness.

4. The TM No. 9A Phase I activities were completed between June 1998 to September 1998. The final monitoring round of the Phase II activities was completed in January 1999.

5. The findings described in this ROF for the soil vapor extraction testing will be incorporated in the Remedial Design (RD) Investigative Activities Summary Report and will be used during the preparation of the Remedial Design.

6. The remainder of this ROF is organized in the following chapters:

- Chapter 2.0 - Rationale and Procedures
- Chapter 3.0 - Summary of TM No. 9A Findings
- Chapter 4.0 - Field and Analytical Data Evaluation
- Chapter 5.0 - SVE Feasibility Evaluations

2.0 RATIONALE AND PROCEDURES

2.1 RATIONALE FOR SVE TESTING

1. SVE testing was intended to provide information on the ability of SVE to remove subsurface soil gas (i.e., methane, VOCs) from the shallow fill zone and the underlying native soil, as well as to measure gas generation rates in these layers following SVE treatment. These parameters were determined by collecting both field measurements and analytical laboratory data on the SVE operating conditions and gas constituents during both Phase I and Phase II activities.

2. The SVE testing program was designed to generate data on the ability of an induced subsurface vacuum to withdraw soil gas from five onsite locations selected to represent the different combinations of soil conditions and the proximity between sump-like material and onsite buildings. The SVE data was used to evaluate the air conductivity and potential zone of influence in each area. This measured ability or inability to withdraw soil gas is critical to future consideration of vacuum induced soil gas controls as potentially viable remedial options.

3. The potential for soil gas migration control by SVE is also evaluated in this ROF.

4. Four of the five SVE test locations (shown in Figure 2.1) were selected based on the presence of sump-like material near potential surface receptors such as onsite commercial/industrial buildings. The fifth area, Area 8, was included in the test, because, although it is outside the footprint of the sump-like material, it has previously shown elevated levels of VOCs during quarterly soil gas monitoring.

5. The extraction flow rates and vacuum achieved in the extraction wells during Phase I provided a measure of the air conductivity in the specific subsurface layer or zone being tested. The extracted soil gas concentrations were used to determine the mass of soil gas extracted from the zone of influence. During Phase II, the constituent concentrations in the specific subsurface layer/zone were used to provide a soil gas generation rate from the sump-like materials, which potentially migrate upward from the sump-like materials into the fill zone, or downward/laterally into the native materials. The TM 9A SVE test was performed only in the fill soils above the waste zone and the native soils below the waste zone.

2.2 TM NO. 9A ACTIVITIES

1. The scope of work for TM No. 9A activities included the following list of tasks for each SVE test area:
   - Installation of two extraction wells (one shallow well in the fill soils and one deep well in the native soils), eight monitoring wells (four shallow and four deep) and four air injection wells (four deep).
   - Monitoring of baseline conditions of extraction wells.
   - Monitoring performance of the SVE unit, soil gas concentrations and radius of influence during Phase I.
   - Monitoring the gas recovery rates during Phase II.

2. The results of SVE testing were used to calculate the following specific soil gas parameters:
   - Air conductivity in the test layer (i.e., fill and native material).
   - Methane (CH_4) and total nonmethane organic compound (TNMOC) generation rates.
   - Benzene (Bz), vinyl chloride (VC), trichloroethelene (TCE), tetrachloroethelene (PCE), and other VOC generation rates.

3. The location for the five SVE test areas are shown in Figure 2.1. These locations were selected in joint meetings between EPA and other regulatory agencies, and the Waste Disposal, Inc. Group (WDIG), based on vapor well data and the location of sump-like materials.

4. In four of the test locations two soil vapor extraction wells (one shallow and one deep) were installed. The SVE extraction wells were then surrounded with a specific geometric pattern of zone of influence monitoring wells, as shown in Figures 2.2 and 2.3. As-built locations are shown in Section 3.0. In the RV storage lot (Area 2) test location, only one shallow extraction well and four shallow monitoring wells were completed, due to the presence of a perched liquid zone in the deeper native material. The zone of influence monitoring wells were placed at increasing distances in different directions from the extraction well (see Figures 2.2 and 2.3) to determine the maximum distance at which the extraction vacuum can be measured. Figure 2.4 depicts typical SVE extraction, monitoring and air injection well construction diagrams.

5. Air injection wells were installed in the native soil, beneath the sump-like material layer, except in Area 8, which was located outside the sump material. As indicated above, in the

RV storage lot (Area 2), only the shallow test wells were completed, and therefore no air injection wells were installed. The injection wells were arranged in a square geometry around the extraction wells to allow the subsurface area to be swept by SVE.

6. The construction of the air injection and influence monitoring wells was similar to the shallow and deep extraction wells. Boring logs and well construction diagrams of the extraction wells, monitoring wells, and air injection wells are provided in Appendix A for each SVE test area.

7. The stratigraphy of the materials encountered was relatively consistent. A silty sand to sandy silt fill layer of at least 5 feet thick occurs over a layer of stained clays (drilling muds), comprising the sump-like material. RV storage lot (Area 2) did not have a deep zone of monitoring due to a perched liquid zone in the native zone. Area 8 was located outside the sump-like material.

2.2.1 SVE FIELD OPERATIONS AND DATA COLLECTION PROCEDURES

1. SVE field operations and data collection procedures were identified for all areas/zones. Prior to the start of SVE operations, the extraction well was purged of two to three well volumes, or until a steady soil gas concentration was observed. The purged gas was monitored for Oxygen (O_2), Methane (CH_4), Carbon Dioxide (CO_2) and total VOCs using field instruments (i.e., LANDTEK Methane Monitor). Once the extraction well reached a steady soil gas concentration, a summa canister sample was collected and submitted to the laboratory for CH_4, CO_2, O_2 and Total Nonmethane Organic Compound (TNMOC) analysis.

2. If the SVE system was not initiated within a few hours of purging the extraction well, the soil gas was again monitored and resampled prior to starting. If there was a significant difference in concentrations from the initial readings, the extraction well was repurged and the monitoring and sampling repeated.

3. A vacuum was then applied to the extraction well using a commercially available SVE unit rented from King Buck, Inc. of San Diego, California. As shown in Figure 2.5, the gas extracted from the well was treated using a catalytic oxidizer built into the SVE unit and

discharged to the atmosphere. The discharge stack was monitored during operations. During the process, the operational parameters such as flow, vacuum and catalytic oxidizer temperatures were routinely monitored to determine the optimum conditions.

4. SVE tests were initiated at low vacuum and flow levels and gradually increased to the maximum sustainable levels. The SVE unit was then operated until the soil gas levels decreased to approximately less than 1 percent methane, or an asymptotic methane condition was observed.

5. Throughout TM No. 9A activities (Phases I and II), the following data was recorded on a routine basis from the extraction well, and the SVE unit:

   - Blower vacuum
   - Blower flow rate
   - Barometric pressure
   - Concentrations of
     - CH_4
     - TNMOC
     - O_2
     - CO_2
     - Bz
     - VC
     - Other VOCs

   The vacuum in the zone of influence monitoring wells and the extraction wells was also monitored on a regular basis. Appendix B contains copies of the data collected in the field from each of the test areas. The instruments that were used to measure these constituents are also listed in Table 2.1.

6. The following parameters were monitored and sampled from the post-blower and discharge stack as part of the SVE treatment evaluation. These monitored parameters include the following:

   - CH_4
   - TNMOC
   - O_2
   - CO_2
   - Bz
   - VC
   - Other VOCs

7. Summa canister samples for analytical laboratory testing were collected on a regular basis throughout the Phase I and II activities as indicated in Table 2.1, and analyzed for the following constituents:

   - CH_4
   - O_2
   - CO_2
   - TNMOC

   Appendix C contains copies of the laboratory reports and Quality Assurance/Quality Control documentation provided on CD-ROM.

8. The SVE tests were started at a low vacuum (approximately 5 to 10 inches of water column [in. WC]). The vacuum was then increased in steps depending on the flow and the SVE unit's treatment capacity. The treatment capacity was determined by balancing the blower vacuum, the well flow and the catalytic oxidizers temperature range requirements. Each vacuum step was maintained long enough to obtain a stable vacuum in monitoring wells that were influenced, or at least two hours, whichever was less. The goal was to obtain a mild vacuum (e.g., 0.1-in. WC) in the most distant well at an extraction well vacuum and flow rate that could be sustained by the blower. The blower had a maximum theoretical suction capability of approximately 160 in. WC.

9. The SVE test in the fill material layer used an extraction well, but no air injection wells since air was expected to enter through the top of the shallow fill zone. The SVE test in the native soil layer was deep enough to require air injection wells at the lateral boundary of the zone of influence through which air was allowed to enter. Once an asymptotic condition was detected in the SVE air stream of the native soil layer, the air injection wells were opened to allow ambient air to sweep through the treatment zone. This procedure preserved the approximately square geometry of the zone of influence shown in Figure 2.3.

10. After a pressure equilibrium was achieved at the maximum vacuum and flow fields, the SVE test was run under constant conditions for up to two weeks until soil gas levels became asymptotic or reached acceptable levels. The rate at which each constituent was removed will be calculated in terms of mass per unit time (e.g., pounds per day) after each interval, as described in Chapter 4.0. At the end of the active SVE testing phase (Phase I), the system and extraction well was sampled, and then shut off to allow recovery of the system (Phase II).

11. After completion of Phase I activities, the vapor extraction well (or monitoring well) was shut off from the SVE unit and its soil gas constituent concentration measured at various intervals, as indicated in Table 2.1. The long-term effectiveness of SVE and the potential for gas generation was evaluated by monitoring the vapor extraction well's recovery period. The parameters shown in Table 2.1 were monitored daily and sampled for laboratory analysis for the first three days after shutdown. After the first three days, these parameters were measured every 7 to 14 days. After 14 days, the SVE and extraction wells were monitored every 3 to 4 weeks until monitoring was terminated.

12. During the recovery monitoring phase (Phase II), EPA requested that constituent monitoring of the zone of influence wells be conducted. During this additional monitoring phase, it was determined that the O_2 levels were unexpectedly high in some of the extraction and monitoring wells. It was therefore determined that the SVE extraction and monitoring wells be purged of at least one to three well volumes prior to sampling. The well purging process was continued throughout the remainder of the Phase II activities. During this sampling, all of the extraction, monitoring and air injection wells were purged and sampled; however, only field data was collected from these wells.

2.2.2 WORKPLAN FIELD MODIFICATIONS

1. During the TM No. 9A field operations, various changes to the workplan procedures were required to be made, due to unexpected field conditions. WDIG notified EPA field oversight personnel of these changes prior to implementation.

2. Table 2.2 provides a summary of the various workplan modifications, rationale for the modifications and the effect on the TM No. 9A results.

3. As indicated in Table 2.2, the most significant change was the introduction of the purging process to the recovery monitoring program. As requested by EPA, the extraction and monitoring wells were vacuum purged prior to sampling for a better representation of the soil gas conditions. This procedure was implemented, and field data was collected during operation.

3.0 SUMMARY OF TM NO. 9A FINDINGS

1. This chapter presents the field and analytical results of the TM No. 9A SVE testing activities (Phase I and Phase II). Results of the testing is summarized by SVE test area. This chapter is divided into the following sections:
   - Section 3.1 - SVE Operational and Monitoring Activities
     - This section summarizes the following information:
       - SVE well locations
       - SVE well construction
       - SVE well integrity and pump testing
       - SVE system startup and operating conditions
   - Section 3.2 - Phase I Active SVE Monitoring Results
     - This section summarizes the following field and laboratory results of the SVE testing activities:
       - SVE vapor well influence monitoring
       - Field monitoring of soil gases and SVE treatment
       - Laboratory analysis of soil gases and SVE treatment
   - Section 3.3 - Phase II SVE Recovery Monitoring Results
     - This section presents the results of the post-SVE soil gas rebound monitoring activities.

2. The following sections summarize the data collected during the TM No. 9A activities, and is presented by area. Data used to generate the information provided in this chapter was collected using the procedures outlined in Section 2.2.1.

3. The location for the SVE testing was selected as part of the TM No. 9A approval process. EPA and other agency oversight personnel and WDIG field personnel selected the final locations for extraction wells during field reconnaissance.

3.1 AREA 5

3.1.1 AREA 5 - BROTHERS MACHINE SHOP (BROTHERS) SVE TESTING AREA SHALLOW ZONE

3.1.1.1 Shallow Zone SVE Testing

1. The shallow zone SVE extraction and monitoring wells were drilled and completed as described in Section 2.2. Figure 3.1 provides a plan view of the well configuration. Boring logs and well construction details are provided in Appendix A.

2. Prior to initiating SVE testing, the shallow zone extraction well (SVW-1) was monitored for the parameters discussed in Section 2.2.1 and shown on Table 2.1. Well SVW-1 was then

purged a minimum of three well volumes using a vacuum pump. Effluent gas was sampled to determine if the well was leaking. The results of the initial testing and purging are shown in Table 3.1.

3. The wells were monitored again and a soil gas sample (i.e., summa canister) collected for laboratory analysis. If the field monitoring results were significantly different (±30 percent) from the purged values, the well was purged again prior to SVE startup.

4. Once the field monitoring results met the above criteria, the SVE unit was started under the following manufacturer's recommended settings:
   - Total Air Flow: 30 cubic feet per minute (cfm).
   - Recycle Air (RA):
     - Approximately 25 percent.
     - The purpose of the recycle is to maintain the catalytic oxidation temperature and to allow adequate treatment of the soil gas stream.
   - Makeup Air (MA):
     - Approximately 30 percent.
     - The purpose of the makeup air is to provide a clean air stream which provides oxygen for the catalytic oxidizer and to reduce the operating temperature.
   - Catalytic Oxidizer: Temperatures are pre-programmed to range from >725° Fahrenheit (°F) to <1,000° F.

5. A vacuum level of approximately 30 in. WC was achieved at the startup of SVE system in the shallow zone. Refer to Table 3.2 which summarizes the following startup conditions at Brothers:
   - Well flow (cfm).
   - Wellhead vacuum (in. WC).
   - RA.
   - MA.
   - Catalytic Oxidizer:
     - Inlet Temperature (°C).
     - Center 1 (°C).
     - Center 2 (°C).
     - Outlet (°C).
   - Influence Monitoring Wells.
   - Air Injection Wells:
     - Monitored during shallow zone SVE testing to check for leaks.
     - Monitored during deep zone SVE testing to record vacuum conditions.

Once the system reached stable conditions, operational parameters noted above were monitored during the SVE startup, then every 2 to 4 hours, as indicated in the workplan.

6. The results for the Brothers SVE shallow zone testing during the systems operational monitoring are provided in Table 3.3.

7. After steady state conditions were achieved, the step testing outlined in the workplan was attempted. However, the step test was not able to be completed in the shallow zone due to the following conditions:
   - The vacuum levels achieved in the outer monitoring wells were very low, (i.e., near the level of sensitivity for the magnahelic units).
   - Reductions or increases in the vacuum levels caused operational upsets and shut the SVE unit down due to catalyst overheating or lack of air flow.

8. During the operational monitoring, field and laboratory measurements of CH_4, O_2, CO_2 and VOCs were obtained. These results are presented in Section 3.2.

9. As shown in Table 3.3, a measurable vacuum was achieved at a distance of 30 feet from well SVW-1. Shallow monitoring probe (SMP) SMP-3, located 30 feet from SVW-1 showed a slightly higher vacuum level compared to SMP-2, located 20 feet from SVW-1. This is likely due to heterogenous soil conditions. Additional discussion of the zone of SVE influence is provided in Section 4.1. Based on the results of the field monitoring activities (i.e., methane levels were below shut-off criteria of less than 1 percent), the SVE unit was shut down on July 17, 1998. Prior to shut down a final set of operational data and monitoring data was collected as shown in Table 3.3.

3.1.1.2 <u>Shallow Zone SVE Monitoring Results</u>

1. The results of the field monitoring and laboratory analyses of the Brothers shallow zone SVE testing are summarized in Table 3.3. As indicated in Section 3.1 and Table 2.1, field measurements and laboratory samples were obtained from three locations:
   - Sampling port to the shallow extraction well wellhead.
   - Sampling port prior to the catalytic oxidizer.
   - Sampling port on the exhaust stack.

   These samples were collected at 2 hour intervals during startup and then a decreasing frequency as the testing progressed. Refer to Table 2.1 for the TM No. 9A activities sampling schedule.

2. Figure 3.2 provides a graph of the laboratory results for the analyses for CH_4, CO_2, O_2, Bz, VC and TNMOC for Brothers shallow zone SVE testing.

3. During the active SVE phase, the following trends were observed, as indicated in Figure 3.2:
   - Methane: CH_4 levels peaked at 0.0268 percent during startup, but steadily decreased to 0.0004 percent at shutdown.
   - Oxygen: Levels decreased on startup, and increased during treatment to approximately 10 percent at shutdown.
   - Carbon Dioxide: CO_2 levels increased to 7.6 percent during startup, gradually decreased to 6.1 percent at shutdown.
   - Benzene: Bz was not detected above the laboratory's reporting limit during the active SVE phase.
   - Vinyl Chloride: VC was not detected above the laboratory's reporting limit during active SVE phase.
   - Total Non-Methane Organic Compounds: TNMOC peaked at 1,050 ppm during start up, decreased sharply to 131 ppm and then gradually decreased to 35 ppm at shutdown.

3.1.1.3 <u>Shallow Zone Vapor Well Recovery</u>

1. One of the objectives of the SVE treatability study was to evaluate the long-term soil gas concentrations after completing active SVE activities, referred to as recovery or rebound. The rebound data will be used to evaluate the long-term gas conditions, and to developed a gas generation rate for RD purposes. Field and laboratory results are provided in Appendices C and D.

2. At the completion of the active SVE activities, the SVE unit was shut down. Samples of the remaining soil gas were collected from the extraction well (SVW-1). SVW-1 was not purged prior to sampling, since purging would not represent the actual soil conditions. The results of this rebound monitoring and sampling are provided in Table 3.4, and shown in Figure 3.3.

3. Figure 3.4 presents the monitoring results (i.e., laboratory) graphically for the SVW-1 data.

4. During the rebound monitoring phase, the following laboratory trends were observed, prior to initiating EPA's purging procedure on October 9, 1998:
   - Methane: CH_4 levels initially decreased from 0.0005 percent to 0.0002 percent then stabilized. Levels decreased to below the laboratory reporting limits following a detection of 0.0003 percent on August 18.

- Carbon Dioxide: CO_2 levels slightly decreased during the first few days of rebound monitoring from 5.1 percent to 2 percent. Levels then gradually increased to approximately 8 percent.
- Oxygen: O_2 levels increased from 7.9 percent to 15.7 percent during the first few days of rebound monitoring. Levels then gradually decreased to 7.9 percent throughout the remainder of the test.
- Benzene: Bz levels spiked to 92 ppb and then decreased to below the laboratory reporting limits.
- Vinyl Chloride: VC levels remained below the laboratory reporting limits.
- Total Non-Methane Organic Compounds: TNMOC levels gradually decreased from 176 ppm to 37 ppm throughout the rebound monitoring.

4. After implementing EPA's purging requirements, the following trends were observed in SVW-1:
   - Methane: CH_4 levels increased slightly to approximately 0.03 percent.
   - Carbon Dioxide: CO_2 levels increased slightly to approximately 9.2 percent.
   - Oxygen: O_2 levels decreased from approximately 6.6 percent to 2.4 percent.

5. The following trends were observed during monitoring of the shallow SVE zone of influence monitoring wells as shown in Figure 3.5:
   - Methane: Levels remained steady at 0.0 to 0.1 percent.
   - Carbon Dioxide: Levels slightly increased.
   - Oxygen: Levels remained steady, except for well SMP-3, which increased to approximately 18.4 percent.

3.1.2 AREA 5 - BROTHERS MACHINE SHOP SVE TESTING AREA DEEP ZONE

3.1.2.1 Deep SVE Zone Testing

1. The deep zone SVE extraction and monitoring wells, including air injection wells, were drilled and completed as described in Section 2.2. Figure 3.6 provides a plan view of the well configuration. Boring logs and well construction details are provided in Appendix A.

2. Initial testing and purging activities for the Brothers deep zone SVE testing were performed similar to the shallow zone activities. The results of the initial testing and purging are shown in Table 3.1.

3. Startup of the deep zone SVE system was on July 20, 1998 at approximately 08:00 hours. The initial settings recorded a vacuum of -2.5 in. WC at the wellhead. Refer to Table 3.2 for startup settings.

4. In accordance with the workplan, the vacuum level was gradually increased in steps over the next 18 days, to a final vacuum level of -8.0 in. WC. On August 4, 1998, the air injection vents were opened to increase the air flow. CH_4 levels increased slightly and then declined. O_2 levels increased approximately 2 percent as would be expected. During the operational monitoring, field and laboratory measurements of CH_4, O_2, CO_2 and VOCs were obtained. These results are presented in Table 3.5.

5. As shown in Table 3.5, a measurable vacuum was achieved at a distance of over 60 feet from the extraction well (DVW-1). The distribution of vacuum appeared to be consistent with the distance of the wells from the vacuum source. Additional discussions of the zone of SVE influence is provided in Section 4.1.

6. On August 7, 1998, the SVE unit was shut down as the methane levels became asymptotic at approximately 1 percent. The final shut down conditions are also shown in Table 3.5.

3.1.2.2 Deep Zone SVE Monitoring Results

1. The results of the field monitoring and laboratory analyses of the Brothers deep zone SVE testing are summarized in Table 3.5. These samples were collected as described in Section 3.1 and Table 2.1.

2. Figure 3.7 provides a graph of the laboratory analyses for CH_4, CO_2, O_2, Bz, VC and TNMOC for Brother deep zone SVE testing.

3. During the active SVE phase, the following laboratory trends were observed, as indicated in Figure 3.7:

   - Methane: CH_4 levels increased during startup to approximately 3.5 percent, then gradually decreased over 8 days to approximately 1.3 percent. On July 28, a field measurement of 0.2 percent was recorded. CH_4 levels rebounded to 2.6 percent on July 29, but began to decline to a level of 0.4 percent on August 4. CH_4 rebounded to 1.8 percent and eventually stabilized on August 5 at 1.5 percent.

- Oxygen: O_2 levels fluctuated throughout the active phase, dropping initially, then remaining constant at approximately 1 percent until it spiked to 9.7 percent on July 28. The oxygen spike appears to be an anomaly due to a sampling leak. Levels quickly dropped back to 1 percent remaining steady until August 4, when another spike was recorded at 8.4 percent when the air injection vents were opened. Levels quickly dropped again to 1.3 percent on August 5 and then slightly increased to 2.4 percent at shutdown.
- Carbon Dioxide: CO_2 levels followed a pattern similar to the CH_4 levels.
- Benzene: Bz levels fluctuated throughout the active phase. Bz levels were initially nondetected until July 21 (80 ppm). Levels continued to increase to 170 ppb until July 23, when laboratory results were nondetect. Bz was again detected on July 24 at 85 ppb and increased to 204 ppb on July 27. Levels decreased on July 28, followed by a sharp increase on July 31. Levels decreased again on August 4 to 11.4 ppb, increasing again to 96 ppb on August 6. Levels fell to 49 ppb at shutdown.
- Vinyl Chloride: VC levels followed a pattern similar to the Bz levels.
- Total Non-Methane Organic Compounds: TNMOC peaked at 1,460 ppm at startup, but quickly decreased to 591 ppm. Levels continued to gradually decrease to 243 ppm until July 28. A slight increase to 430 ppm was observed on July 30 followed by a decrease to 62 ppm on August 4. On August 6, levels again increased to 261 ppm. At shutdown, TNMOC levels decreased to 158 ppm.

It should be understood that the fluctuations observed during SVE are related to changes in flow conditions, vacuum levels, monitoring variation and the volatility of the constituents. Figures 3.2 and 3.7 through 3.14 provide additional information on the fluctuations observed.

3.1.2.3 Deep Zone Vapor Well Recovery

1. At the completion of the active SVE activities, the SVE unit was shut down. Samples of the remaining soil gas were collected from the extraction well (DVW-1). DVW-1 was not purged prior to sampling, since purging would not represent the actual soil conditions. The results of this rebound monitoring and sample are provided in Table 3.6, and shown in Figure 3.15.

2. Figure 3.16 presents the monitoring results (i.e., laboratory) graphically for DVW-1 data.

3. During the rebound monitoring phase, the following laboratory trends were observed, prior to initiating EPA's purging procedure on October 9, 1998:
   - Methane: CH_4 levels decreased from 1.6 percent to below 0.0001 percent.
   - Carbon Dioxide: CO_2 levels initially increased from 5.8 percent to 11.4 percent. Levels then gradually decreased to 7.8 percent.
   - Oxygen: O_2 levels ranged from approximately 2.0 percent to 7.2 percent.

- Benzene: Bz levels initially decreased from 62 ppb to below laboratory reporting limits. Levels gradually decreased to 38 ppb throughout the remainder of the rebound period.
- Vinyl Chloride: VC levels followed a similar pattern as Bz levels.
- Total Non-Methane Organic Compounds: TNMOC levels increased throughout the rebound period.

4. After implementing EPA's purging requirements, the following trends were observed in DVW 1:
   - Methane: CH_4 levels increased to approximately 2.3 percent then decreased to 1.8 percent.
   - Carbon Dioxide: CO_2 levels increased to over 15 percent.
   - Oxygen: O_2 levels decreased from approximately 7 to zero percent.

5. The following trends were observed during monitoring of the deep SVE zone of influence wells as shown in Figure 3.15:
   - Methane: Wells DMP-2 and AIV-4 showed elevated methane levels. The remaining wells indicated relatively low methane levels (0.3 to 1.7 percent).
   - Carbon Dioxide: CO_2 levels were elevated throughout the area, indicating biodegradation.
   - Oxygen: O_2 levels were generally very near zero, except for DMP-3 (approximately 8.3 percent).

3.2 AREA 2 - C&E DIE SVE TESTING AREA

3.2.1 AREA 2 - C&E DIE SVE TESTING AREA - SHALLOW ZONE

3.2.1.1 Shallow Zone SVE Testing

1. The shallow zone SVE extraction and monitoring wells were drilled and completed as described in Section 2.2. Figure 3.17 provides a plan view of the well configuration. Boring logs and well construction details are provided in Appendix A.

2. Prior to initiating the SVE test, the shallow zone extraction well (SVW-1) was monitored for the parameters discussed in Section 2.2.1 and shown on Table 2.1. SVW-1 was then purged a minimum of three well volumes using a vacuum pump. Effluent gas was sampled to determine if the well was leaking. The results of the initial testing and purging are shown in Table 3.1.

3. Startup of the shallow zone SVE system was on July 22, 1998 at approximately 08:00 hours. The initial settings recorded a vacuum of -8 in. WC at the wellhead. Refer to Table 3.7 for startup settings.

4. In accordance with the workplan, the vacuum level was gradually increased in steps over the next 24 hours, to a final vacuum level of -10 in. WC. This level was determined to be the maximum sustainable vacuum, given the SVE units operating constraints (i.e., catalytic oxidizer temperature). During the operational monitoring, field and laboratory measurements of CH_4, O_2, CO_2 and VOCs were obtained. These results are presented in Table 3.8.

5. As shown in Table 3.8, a measurable vacuum was achieved at a distance of over 30 feet from SVW-1. SMP-2, located 20 feet from SVW-1, showed lower vacuum levels than anticipated throughout the test. This was likely due to heterogenous soil conditions. Additional discussions of the zone of SVE influence is provided in Section 4.1.

6. The system was shut down on July 24, 1998 because CH_4 and VOC levels decreased to below the shut down criteria (i.e., less than 1 percent). The shutdown conditions are also shown in Table 3.8.

3.2.1.2 Shallow Zone SVE Monitoring Results

1. The results of the field monitoring and laboratory analyses of the C&E Die shallow zone SVE testing are summarized in Table 3.8. These samples were collected as described in Section 3.1 and Table 2.1.

2. Figure 3.8 provides a graph of the laboratory analyses for CH_4, CO_2, O_2, Bz, VC and TNMOC for C&E Die shallow zone SVE testing.

3. During the active SVE phase, the following laboratory trends were observed, as indicated in Figures 3.8:
   - Methane: CH_4 levels increased throughout the first day of monitoring to 0.29 percent. During the remaining active phase period, levels steadily decreased to 0.045 percent.
   - Oxygen: O_2 levels steadily increased throughout the active phase to approximately 21 percent.
   - Carbon Dioxide: CO_2 levels gradually declined during the active phase to approximately 0.5 percent.
   - Benzene: Initial Bz levels were detected at 110 ppb followed by a sharp decrease to approximately 20 ppb. Levels then gradually decreased to 1 ppb at shutdown.
   - Vinyl Chloride: VC levels were initially at 140 ppb, and followed a pattern similar to the Bz levels, decreasing to 1.1 ppb.

- Total Non-Methane Organic Compounds: TNMOC levels initially started at 3,000 ppm, and also followed a pattern similar to the Bz levels, decreasing to 36 ppm.

3.2.1.3 Shallow Zone Vapor Well Recovery

1. At the completion of the active SVE activities, the SVE unit was shut down. Samples of the remaining soil gas were collected from the extraction well (SVW-1). SVW-1 was not purged prior to sampling, since purging would not represent the actual soil conditions. The results of this rebound monitoring and sampling are provided in Table 3.9, and shown in Figure 3.18.

2. Figure 3.19 presents the monitoring results (i.e., laboratory) graphically for SVW-1 data.

3. During the rebound monitoring phase, the following laboratory trends were observed, prior to initiating EPA's purging procedure on October 9, 1998:
   - Methane: CH_4 levels decreased from 0.1 percent to less than 0.01 percent.
   - Carbon Dioxide: CO_2 levels gradually increased from approximately 0.52 percent to 6.8 percent.
   - Oxygen: O_2 levels initially decreased from 19.9 percent to 13.8 percent. Levels then increased to approximately 20 percent where it remained stable for 7 days before decreasing to 11.7 percent on September 10.
   - Benzene: Bz levels increased initially to a maximum of 41 ppb and then gradually decreased to below laboratory reporting limits.
   - Vinyl Chloride: VC levels decreased from a maximum level of 140 ppb to below laboratory reporting limits.
   - Total Non-Methane Organic Compounds: TNMOC levels increased to a maximum of 670 ppm and then declined to 29 ppm.

4. After implementing EPA's purging requirements, the following trends were observed in SVW-1:
   - Methane: CH_4 levels remained at less than 0.01 percent throughout the recovery monitoring.
   - Carbon Dioxide: CO_2 levels increased from 6.4 percent to 7.7 percent during the recovery monitoring.
   - Oxygen: O_2 levels decreased from approximately 19 percent to less than 4 percent.

5. The following was observed during the monitoring of the shallow SVE zone of influence monitoring wells as shown in Figure 3.18:
   - Methane: CH_4 levels are near zero at each well except SMP-1 (40.1 percent). SMP-1 has typically shown high CH_4 levels ranging from 15 to 40.1 percent. This anomaly has not been explained but appears to be isolated to this area.
   - Carbon Dioxide: CO_2 levels have remained relatively stable.
   - Oxygen: O_2 levels ranged from 2.6 percent to 20.4 percent except in SMP-1, which has remained near zero.

3.2.2 AREA 2 C&E DIE SVE TESTING AREA - DEEP ZONE

3.2.2.1 <u>Deep Zone SVE Testing</u>

1. The deep zone extraction and monitoring wells, including air injection wells, were drilled and completed as described in Section 2.2. Figure 3.20 provides a plan view of the well configuration. Boring logs and well construction details are provided in Appendix A.

2. Initial testing and purging activities for C&E Die deep zone SVE testing were performed similar to the shallow zone activities. The results of the initial testing and purging are shown in Table 3.1.

3. Startup of the deep zone SVE system was on July 28, 1998 at approximately 08:00 hours. The initial settings recorded a vacuum of -10 in. WC at the wellhead. Refer to Table 3.7 for startup settings.

4. In accordance with the workplan, the vacuum level was gradually increased to a final vacuum level of -23 in. WC. During the operational monitoring, field and laboratory measurements of CH_4, O_2, CO_2 and VOCs were obtained. These results are presented in Table 3.9.

5. As shown in Table 3.10, a measurable vacuum was achieved at a distance of at least 60 feet from the extraction well (DVW-1). The vacuum distribution appears to be consistent with the distance of the wells from the vacuum source. Additional discussion of the zone of SVE influence is provided in Section 4.1.

6. On August 5, 1998 the air injection vents were opened to increase the air flow. CH_4 levels decreased slightly, and O_2 levels increased approximately 2 percent, which would be expected. On August 7, 1998 the SVE system was shut down since the methane levels were below 1 percent. The final shutdown conditions are also shown in Table 3.9.

3.2.2.2 Deep Zone SVE Monitoring Results

1. The results of the field monitoring and laboratory analyses of the C&E Die deep zone SVE testing are summarized in Table 3.9. These samples were collected as described in Section 3.1 and Table 2.1.

2. Figure 3.9 provides a graph of the laboratory analyses for CH_4, O_2, CO_2, Bz, VC and TNMOC for C&E Die deep zone SVE testing.

3. During the active SVE phase, the following laboratory trends were observed, as indicated in Figures 3.9:
   - Methane: CH_4 levels increased from approximately 1.6 percent to 3.4 percent at startup. Levels then steadily declined to approximately 0.6 percent, increasing slightly to 1 percent at shutdown.
   - Oxygen: O_2 levels decreased at startup from 13 percent to 1.1 percent. Levels then gradually increased to approximately 5 percent at shutdown.
   - Carbon Dioxide: CO_2 levels increased initially to approximately 18 percent, and decreased throughout the remainder of the active phase to approximately 14 percent at shutdown.
   - Benzene: Bz levels increased from below laboratory reporting limits at startup to 61 ppb. A gradual increase to 180 ppb was observed on August 6. Levels then decreased to 160 ppb at shutdown.
   - Vinyl Chloride: VC levels gradually increased from below laboratory reporting limits to 90 ppb on July 29. Levels fluctuated between 38 ppb to approximately 90 ppb until the system was shut off on August 7 with a shutoff reading of 80 ppb.
   - Total Non-Methane Organic Compounds: TNMOC levels decrease from approximate 5,800 ppm at startup (July 28) to 840 ppm (July 29), followed by an increase to 2,700 ppm on August 1. Levels remained fairly steady until decreasing to 1,600 ppm at shutdown.

3.2.2.3 Deep Zone Vapor Well Recovery

1. At the completion of the active SVE activities, the SVE unit was shut down. Samples of the remaining soil gas were collected from the extraction well (DVW-1). DVW-1 was not purged prior to sampling, since purging would not represent the actual soil conditions. The results of this rebound monitoring and sampling are provided in Table 3.10, and shown in Figure 3.21.

2. Figure 3.22 presents the monitoring results (i.e., laboratory) graphically for DVW-1 data.

3. During the rebound monitoring phase, the following laboratory trends were observed, prior to initiating EPA's purging procedure on October 9, 1998:
   - Methane: CH_4 levels ranged from approximately 1.0 percent to about 0.04 percent.
   - Carbon Dioxide: CO_2 levels decreased from about 14 percent to 1.2 percent.
   - Oxygen: O_2 levels increased from about 6 percent to approximately 19 percent.

4. After implementing EPA's purging requirements, the following trends were observed in DVW 1:
   - Methane: CH_4 levels ranged from zero percent to about 0.6 percent.
   - Carbon Dioxide: CO_2 levels increased significantly from 0.8 percent to 19.8 percent.
   - Oxygen: O_2 levels decreased significantly to zero percent.

5. The following was observed during the monitoring of the shallow SVE zone of influence monitoring wells as shown in Figure 3.21:
   - Methane: CH_4 levels have remained low (i.e., approximately 1.0 to 2.0 percent) throughout the test period.
   - Carbon Dioxide: CO_2 levels were relatively high throughout the test, which is indicative of biodegradation.
   - Oxygen: O_2 levels have declined ranging from zero to 1.5 percent.

3.3 AREA 7 SVE TESTING AREA

3.3.1 AREA 7 SVE TESTING AREA - SHALLOW ZONE

3.3.1.1 Shallow Zone SVE Testing

1. The shallow zone SVE extraction and monitoring wells were drilled and completed as described in Section 2.2. Figure 3.23 provides a plan view of the well configuration. Boring logs and well construction details are provided in Appendix A.

2. Prior to initiating the SVE test, the shallow zone extraction well (SVW-1) was monitored for parameters discussed in Section 2.1.1 on shown on Table 2.1. SVW-1 was then purged a minimum of three well volumes using a vacuum pump. Effluent gas was sampled to determine if the well was leaking. The results of the initial testing and purging are shown in Table 3.1.

3. Startup of the shallow zone SVE system was on August 10, 1998 at approximately 08:00 hours. The initial settings recorded a vacuum of -10.5 in. WC at the wellhead. Refer to Table 3.11 for startup settings.

4. In accordance with the workplan, the vacuum level was gradually increased in steps, to a final vacuum level of approximately -13 in. WC. During the operational monitoring, field and laboratory measurements of CH_4, O_2, CO_2 and VOCs were obtained. These results are presented in Table 3.12 for SVW-1 vacuum measurements during operational monitoring.

5. As shown in Table 3.12, a measurable vacuum was achieved at a distance of approximately 30 feet from SVW-1. The distribution of the vacuum appeared to be consistent with the distance from the extraction well. Additional discussion of the zone of SVE influence is provided in Section 4.1.

6. On August 17, 1998, the SVE system was shut down since the well head flow levels were very low, and the concentration of methane was near zero percent. The final shutdown conditions are also shown in Table 3.12.

3.3.1.2 Shallow Zone SVE Monitoring Results

1. The results of the field monitoring and laboratory analyses of the Area 7 shallow zone SVE testing are summarized in Table 3.12. These samples were collected as described in Section 3.1 and Table 2.1.

2. Figure 3.14 provides a graph of the laboratory analyses for CH_4, CO_2, O_2, Bz, VC and TNMOC for Area 7 shallow zone SVE testing.

3. During the active SVE phase, the following laboratory trends were observed, as indicated in Figures 3.10:

   - Methane: CH_4 levels increased from approximately 0.4 percent during startup (August 10) to approximately 0.88 percent. This increase is in response to the gradual vacuum increase associated with the step testing. After the maximum vacuum level was achieved, methane levels decreased to approximately 0.05 percent at shutdown (August 17).
   - Oxygen: O_2 levels increased from 1.8 percent at startup to 9.24 percent (August 13). Levels decreased to 7.8 percent before increasing to 8.4 percent at shutdown.
   - Carbon Dioxide: CO_2 levels declined from 9.6 percent at startup, then remained at a steady level of approximately 5 to 6 percent until shutdown.
   - Benzene: Bz levels were below laboratory reporting limits for the first day of the active phase. The second day showed a sharp increase to a maximum level of 9.4 ppb. This was followed by a gradual decrease to 6 ppb at shutdown.
   - Vinyl Chloride: VC levels were below the laboratory reporting limits throughout the active phase except for 2.2 ppb on August 16. The detection of VC may be a laboratory error, or may be due to changes in the zone of influence.
   - Total Non-Methane Organic Compounds: TNMOC levels decreased significantly after startup from 3,900 ppm to 700 ppm then gradually declined to 42 ppm at shutdown.

3.3.1.3 Shallow Zone Vapor Well Recovery

1. At the completion of the active SVE activities, the SVE unit was shut down. Samples of the remaining soil gas were collected from the extraction well (SVW-1). SVW-1 was not purged prior to sampling, since purging would not represent the actual soil conditions. The results of this rebound monitoring and sampling are provided in Table 3.13, and shown in Figure 3.24.

2. Figure 3.25 presents the monitoring results (i.e., laboratory) graphically for SVW-1 data.

3. During the rebound monitoring phase, the following laboratory trends were observed, prior to initiating EPA's purging procedure on October 9, 1998:

   - Methane: CH_4 levels ranged from approximately 0.01 percent to 0.187 percent.
   - Carbon Dioxide: CO_2 levels gradually increased from 7.8 percent to 11 percent.
   - Oxygen: O_2 levels decreased from 4.1 percent to 0.8 percent.
   - Benzene: Bz levels steadily increased throughout the rebound period from 2.3 ppb to 7 ppb.

- Vinyl Chloride: VC levels remained below the laboratory reporting limits until the last laboratory sample (2.4 ppb).
- Total Non-Methane Organic Compounds: TNMOC levels increased to a maximum of 720 ppm and then decreased to 174 ppm at the end of the rebound period.

4. After implementing EPA's purging requirements, the following trends were observed in SVW-1:
   - Methane: CH_4 levels increased to 0.2 percent and then decreased to approximately 0.05 percent.
   - Carbon Dioxide: CO_2 levels continued to decline to less than 7.3 percent.
   - Oxygen: O_2 levels remained near zero percent.

5. The following was observed during the monitoring of the shallow SVE zone of influence monitoring wells as shown in Figure 3.24:
   - Methane: CH_4 levels were generally low (i.e., zero to 0.1 percent), with the exception of SMP-1 which showed levels of 1.6 percent.
   - Carbon Dioxide: CO_2 levels were elevated in wells except SMP-3, which is indicative of biological degradation. SMP-3 had relatively low CO_2 levels (i.e., ranging from zero to 3.9 percent).
   - Oxygen: O_2 levels were generally near percent, with exception of SMP-2 (8.7 percent) and SMP-3 (14.9 percent), which had elevated oxygen levels.

3.3.2 AREA 7 SVE TESTING AREA - DEEP ZONE

3.3.2.1 Deep Zone SVE Testing

1. The deep zone extraction and monitoring wells, including air injection wells, were drilled and completed as described in Section 2.2. Figure 3.26 provides a plan view of the well configuration. Boring logs and well construction details are provided in Appendix A.

2. Initial testing and purging activities for Area 7 deep zone SVE testing were performed similar to the shallow zone activities. The results of the initial testing and purging are shown in Table 3.1.

3. Startup of the deep zone SVE system was on August 12, 1998 at approximately 07:30 hours. The initial settings recorded a vacuum of -4 in. WC at the wellhead. Refer to Table 3.11 for startup settings.

4. In accordance with the workplan, the vacuum level was gradually increased in steps over the next 9 days, to a final vacuum level of -26.5 in. WC. During the operational monitoring, field and laboratory measurements of CH_4, O_2, CO_2 and VOCs were obtained. These results are presented in Table 3.14 for DVW-1 vacuum measurements during operational monitoring.

5. As shown in Table 3.14, a measurable vacuum was achieved at a distance of greater than 60 feet from the extraction well. The distribution of the vacuum appeared to be consistent with the distance from the extraction well, with the exception of AIV-1, which showed essentially no vacuum during the tests. Additional discussions of the zone of SVE influence is provided in Section 4.1.

6. On August 19, 1998, the air injection vents were opened to increase the air flow. CH_4 levels decreased slightly. O_2 levels were observed to increase approximately 4 to 5 percent. On August 24, 1998 the SVE system was shut down since contaminant level had decreased to near zero percent. The final shutdown conditions are also shown in Table 3.14.

3.3.2.2 Deep Zone SVE Monitoring Results

1. The results of the field monitoring and laboratory analyses of the Area 7 deep zone SVE testing are summarized in Table 3.14. These samples were collected as described in Section 3.1 and Table 2.1.

2. Figure 3.11 provides a graph of the laboratory analyses for CH_4, CO_2, O_2, Bz, VC and TNMOC for Area 7 deep zone SVE testing.

3. During the active SVE phase, the following laboratory trends were observed, as indicated in Figure 3.11:
   - Methane: CH_4 levels increased during startup (August 12) from approximately 0.08 percent to approximately 1.3 percent. Levels then declined back to 0.08 percent at shutdown (August 24).
   - Oxygen: O_2 levels decreased immediately from 23 percent to 1.4 percent at startup. Levels gradually increased back to approximately 14 percent at shutdown.
   - Carbon Dioxide: CO_2 levels increased from less than laboratory reporting limits during startup to approximately 17 percent. Levels then gradually declined back to approximately 8 percent at shutdown.

- Benzene: Bz levels remained below laboratory reporting limits until August 15 when Bz was detected at 2.5 ppb. Levels increased to approximately 3.5 ppb; then decreased back to below the laboratory reporting limits on August 18. Levels remained nondetect until shutdown.
- Vinyl Chloride: VC levels followed similar pattern as the benzene levels. However, levels of VC remained above laboratory reporting limits and only decreased below the reporting limit on August 21.
- Total Non-Methane Organic Compounds: TNMOC level peaked at 600 ppm and then decreased to 54 ppm at shutdown.

3.3.2.3 <u>Deep Zone Vapor Well Recovery</u>

1. At the completion of the active SVE activities, the SVE unit was shut down. Samples of the remaining soil gas were collected from the extraction well (DVW-1). DVW-01 was not purged prior to sampling, since purging would not represent the actual soil conditions. The results of this rebound monitoring and sampling are provided in Table 3.15, and shown in Figure 3.27.

2. Figure 3.28 presents the monitoring results (i.e., laboratory) graphically for the DVW-1 data.

3. During the rebound monitoring phase, the following laboratory trends were observed, prior to initiating EPA's purging procedure on October 9, 1998:
   - Methane: CH_4 levels ranged from below laboratory reporting limits to 0.05 percent.
   - Carbon Dioxide: CO_2 levels initially decreased from 5.2 percent to 0.06 percent. During the remainder of the rebound period, CO_2 levels were below 1.7 percent.
   - Oxygen: O_2 levels remained above 15 percent.
   - Benzene: Bz levels remained below the laboratory reporting limits for entire rebound monitoring test.
   - Vinyl Chloride: VC levels remained below the laboratory reporting limits for entire rebound monitoring test.
   - Total Non-Methane Organic Compounds: TNMOC levels increased to 390 ppm, then decreased to 78 ppm. Levels rebounded to 163 ppm. This was followed by a gradual decrease to 31 ppm for the remainder of the rebound phase.

4. After implementing EPA's purging requirements, the following trends were observed in DVW-1:
   - Methane: After the purging process was implemented, methane levels ranged from approximately 0.0 percent to 0.6 percent.
   - Carbon Dioxide: CO_2 levels increased to about 13.7 percent.
   - Oxygen: O_2 levels decreased to near zero percent after purging.

5. The following was observed during the monitoring of the shallow SVE zone of influence monitoring wells as shown in Figure 3.21:
   - Methane: CH_4 levels appear relatively low (i.e., <1.0 percent).
   - Carbon Dioxide: CO_2 levels are elevated throughout the test area, which is indicative of biological degradation.
   - Oxygen: O_2 levels are generally near zero percent throughout the deep zone SVE test area.

3.4 AREA 8 SVE TESTING AREA

3.1.4 AREA 8 SVE TESTING AREA - SHALLOW ZONE

3.4.1.1 Shallow Zone SVE Testing

1. The shallow zone SVE extraction and monitoring wells were drilled and completed as described in Section 2.2. Figure 3.29 provides a plan view of the well configuration. Boring logs and well construction details are provided in Appendix A.

2. Prior to initializing the SVE test, the shallow vapor extraction well (SVW-1) was monitored for parameters discussed in Section 2.1.1 and shown on Table 2.1. SVW-1 was purged a minimum of three well volumes using a vacuum pump. Effluent gas was sampled to determine if the well was leaking. The results of the initial testing and purging are shown in Table 3.1.

3. Startup of the shallow zone SVE system was on September 10, 1998 at approximately 08:00 hours. The initial settings recorded a vacuum of -4 in. WC at the wellhead. Due to mechanical problems, the SVE unit was replaced with the backup unit, and the system restarted at 14:15 hours. The new settings were as follows:
   - Initial Air Flow: 810 cfm.
   - RA: 10 percent.
   - MA: 90 percent.
   - Catalytic oxidizer temperature ranged from 718 °F to 735 °F resulting in a vacuum level -2.0 in. WC.

   Refer to Table 3.16 for startup settings.

4. In accordance with the workplan, the vacuum level was gradually increased in steps over the next 18 days, to a final vacuum level of approximately 40 in. WC. During the operational monitoring, field and laboratory measurements of CH_4, O_2, CO_2 and VOCs were obtained. These results are presented in Table 3.17 for SVW-1 vacuum measurements during operational monitoring.

5. As shown in Table 3.17, a measurable vacuum was achieved at a distance of 20 to 30 feet from SVW-1. The distribution of the vacuum appears to be generally consistent with the distance from SVW-1. Additional discussions of the zone of SVE influence is provided in Section 4.1.

6. On September 17, 1998 the SVE system was shut down since methane levels were essentially zero percent. The final shutdown conditions are also shown in Table 3.17.

3.4.1.2 Shallow Zone SVE Monitoring Results

1. The results of the field monitoring and laboratory analyses of the Area 8 shallow zone SVE testing are summarized in Table 3.17. These samples were collected as described in Section 3.1 and Table 2.1.

2. Figure 3.12 provides a graph of the laboratory analyses for CH_4, CO_2, O_2, Bz, VC and TNMO for Area 8 shallow zone SVE testing.

3. During the active SVE phase, the following laboratory trends were observed, as indicated in Figure 3.12:
   - Methane: CH_4 levels were not detected above the laboratory reporting limits during the first two sampling episodes (September 10). The SVE unit malfunctioned and was replaced at that time. At startup of the new unit, the CH_4 levels were 0.0038 percent, which sharply increased to 0.02 percent, followed by a sharp decrease to 0.003 percent. The sharp increase to 0.02 percent on September 11 occurred when the vacuum was increased to 4.0 in. WC. CH_4 level increased slightly before falling to 0.003 percent at shutdown.
   - Oxygen: O_2 levels increased from 4.7 percent to 20.7 percent during startup. The SVE unit failed and was replaced during startup, causing a temporary decrease in O_2 levels to 6.4 percent. O_2 levels then continued to increase to approximately 19 percent at shutdown.
   - Carbon Dioxide: CO_2 levels decreased from 13 percent to 0.04 percent during startup. The SVE unit failed and was replaced. CO_2 levels increased initially to 13.5 percent then continued to decrease to 1.3 percent at shutdown.

- Benzene: Bz levels were not detected above the laboratory reporting limits for active SVE phase.
- Vinyl Chloride: After initial detection of 8 ppb at startup, VC levels fell below laboratory reporting limits for remainder of the active phase.
- Total Non-Methane Organic Compounds: Initial TNMOC levels (669 ppm) decreased to 6 ppm followed by an increase to 346 ppm, due to replacement of the SVE unit. Levels decreased for the remainder of the test to below laboratory reporting limits.

3.4.1.3 Shallow Zone Vapor Well Recovery

1. At the completion of the active SVE activities, the SVE unit was shut down. Samples of the remaining soil gas were collected from the extraction well (SVW-1). SVW-1 was not purged prior to sampling, since purging would not represent the actual soil conditions. The results of this rebound monitoring and sampling are provided in Table 3.18, and shown in Figure 3.30.

2. Figure 3.31 presents the monitoring results (i.e., laboratory) graphically for SVW-1 data.

3. During the rebound monitoring phase, the following trends were observed, prior to initiating EPA's purging procedure on October 9, 1998:
   - Methane: CH_4 levels decreased and remained near zero until October 2, where levels increased to 0.003 percent.
   - Carbon Dioxide: CO_2 levels gradually increased to 7 percent.
   - Oxygen: O_2 levels decreased gradually to 8.4 percent.
   - Benzene: Bz levels were below the laboratory reporting limits during the rebound phase.
   - Vinyl Chloride: VC levels were below the laboratory reporting limits during the rebound phase.
   - Total Non-Methane Organic Compounds: TNMOC levels gradually increased to 32 ppm.

4. After implementing EPA's purging requirements, the following trends were observed at SVW-1:
   - Methane: CH_4 levels increased initially to about 1.9 percent, and then decreased to near zero levels.
   - Carbon Dioxide: CO_2 levels increased to 16.8 percent, and then declined to about 10 percent.
   - Oxygen: O_2 levels remained near zero percent.

5. The following was observed during the monitoring of the shallow SVE zone of influence monitoring wells as shown in Figure 3.30:
   - Methane: CH_4 levels were near zero percent throughout the test area.
   - Carbon Dioxide: CO_2 levels were slightly elevated throughout the test area.
   - Oxygen: O_2 levels are near zero percent throughout the test area.

3.4.2 AREA 8 SVE TESTING AREA - DEEP ZONE

3.4.2.1 <u>Deep Zone SVE Testing</u>

1. The deep zone extraction and monitoring wells, including air injection wells, were drilled and completed as described in Section 2.2. Figure 3.32 provides a plan view of the well configuration. Boring logs and well construction details are provided in Appendix A.

2. Initial testing and purging activities for Area 8 deep zone SVE testing were performed similar to the shallow zone activities. The results of the initial testing and purging are shown in Table 3.1.

3. Startup of the deep zone SVE system was on September 17, 1998 at approximately 07:30 hours. The initial settings recorded a vacuum of -10 in. WC at the wellhead. Refer to Table 3.16 for startup settings.

4. In accordance with the workplan, it was attempted to increase the vacuum level in steps. However, due to the limited flow from the well, and the built-in safety controls on the SVE unit, the conditions could not be sufficiently altered to conduct a true step test. During the operational monitoring, field and laboratory measurements of CH_4, O_2, CO_2 and VOCs were obtained. These results are presented in Table 3.19 for SVW-1 vacuum measurements during operational monitoring.

5. As shown in Table 3.19, a measurable vacuum was achieved at a distance of greater than 60 feet from the extraction well. The distribution of the vacuum appears to be consistent with the distance from DVW-1. Additional discussions of the zone of SVE influence is provided in Section 4.1.

6. On September 17, 1998, the air injection vents were opened to increase the air flow. No significant changes for CH_4 on O_2 concentrations were observed following the opening of the air injection vents. On September 21, 1998, the SVE system was shut down since the methane levels were near zero percent. The final shutdown conditions are also shown in Table 3.19.

3.4.2.2 Deep Zone SVE Monitoring Results

1. The results of the field monitoring and laboratory analyses of the Area 8 deep zone SVE testing are summarized in Table 3.19. These samples were collected as described in Section 3.1 and Table 2.1.

2. Figure 3.13 provides a graph of the laboratory analyses for CH_4, CO_2, O_2, Bz, VC and TNMOC for Area 8 deep zone SVE testing.

3. During the active SVE phase, the following laboratory trends were observed, as indicated in Figure 3.13:
   - Methane: CH_4 levels increased throughout the testing, but remained below 0.02 percent.
   - Oxygen: O_2 levels decreased during startup (September 17) from 20.3 percent to approximately 9 percent. Levels then gradually decreased to 7.4 percent at shutdown (September 18).
   - Carbon Dioxide: CO_2 levels increased during startup from 0.2 percent to approximately 12 percent. Levels then remained steady throughout the remainder of the test at approximately 12.5 percent.
   - Benzene: Bz levels were not detected above laboratory reporting limits during the testing.
   - Vinyl Chloride: VC levels were not detected above laboratory reporting limits were not detected during the testing.
   - Total Non-Methane Organic Compounds: Initial TNMOC levels were 51 ppm. Levels declined for the remainder of the testing to 28 ppm at shutdown.

3.4.2.3 Deep Zone Vapor Well Recovery

1. At the completion of the active SVE activities, the SVE unit was shut down. Samples of the remaining soil gas were collected from the extraction well (DVW-1). DVW-1 was not purged prior to sampling, since purging would not represent the actual soil conditions. The results of this rebound monitoring and sampling are provided in Table 3.20, and shown in Figure 3.33.

2. Figure 3.34 presents the monitoring results (i.e., laboratory) graphically for DVW-1 data.

3. During the rebound monitoring phase, the following laboratory trends were observed, prior to initiating EPA's purging procedure on October 9, 1998:
   - Methane: CH_4 levels decreased from 0.15 percent to 0.0013 percent.
   - Carbon Dioxide: CO_2 levels deceased from 13 percent to approximately 5 percent.
   - Oxygen: O_2 levels increased from approximately 7.6 percent to 15 percent.
   - Benzene: Bz levels remained below laboratory reporting limits.
   - Vinyl Chloride: VC levels remained below laboratory reporting limits.
   - Total Non-Methane Organic Compounds: TNMOC levels increased throughout rebound phase from 78 ppm to 596 ppm.

4. After implementing EPA's purging requirements, the following trends were observed in DVW-1:
   - Methane: CH_4 levels remained between 0.1 percent and 0.2 percent.
   - Carbon Dioxide: CO_2 levels decreased to 4.7 percent, but then increased to 5.5 percent.
   - Oxygen: O_2 levels increased to 13.1 percent, and then decreased to 9.6 percent.

5. The following was observed during the monitoring of the shallow SVE zone of influence monitoring wells as shown in Figure 3.33:
   - Methane: CH_4 levels remain near zero percent throughout the area.
   - Carbon Dioxide: CO_2 levels are slightly elevated throughout the test area.
   - Oxygen: O_2 levels have remained relatively stable. This is consistent with the lack of petroleum hydrocarbons in the test area.

3.5 AREA 2 - RV STORAGE LOT (AREA 2) SVE TESTING AREA

3.5.1 AREA 2 - RV STORAGE LOT (AREA 2) SVE TESTING AREA - SHALLOW ZONE

3.5.1.1 <u>Shallow Zone SVE Testing</u>

1. The shallow zone SVE extraction and monitoring wells were drilled and completed as described in Section 2.2. Figure 3.5 provides a plan view of the well configuration. Boring logs and well construction details are provided in Appendix A.

2. Prior to initializing the SVE test, the shallow vapor extraction well (SVW-1) was monitored for the parameters discussed in Section 2.1.1 and shown on Table 2.1. SVW-1 was purged a minimum of three well volumes using a vacuum pump. Effluent gas was sampled to determine if the well was leaking. The results of the initial testing and purging are shown in Table 3.1.

3. Startup of the shallow zone SVE system was on September 23, 1998 at approximately 08:00 hours. The initial settings recorded a vacuum of -6 in. WC at the wellhead. Refer to Table 3.21 for startup settings.

4. In accordance with the workplan, the vacuum level was gradually increased in steps over the next few days, to a maximum vacuum level of -13 in. WC. During the operational monitoring, field and laboratory measurements of CH_4, O_2, CO_2 and VOCs were obtained. These results are presented in Table 3.22 for SVW-1 vacuum measurements during operational monitoring.

5. As shown in Table 3.22, a measurable vacuum was achieved at a distance of at least 30 feet from SVW-1. The vacuum distribution appears to be consistent with the distance from SVW-1, with the exception of SMP-2, located 20 feet from SVW-1, which showed lower vacuum levels as compared to SMP-3, which is located 30 feet from SVW-1. Additional discussions of the zone of SVE influence is provided in Section 4.1.

6. On September 28, 1998 the SVE system was shut down, since CH_4 levels and VOCs were decreased to below the shut down criteria since methane levels were near zero percent. The final shutdown conditions are also shown in Table 3.22.

3.5.1.2 Shallow Zone SVE Monitoring Results

1. The results of the field monitoring and laboratory analyses of the RV Storage Lot shallow zone SVE testing are summarized in Table 3.21. These samples were collected as described in Section 3.1 and Table 2.1.

2. Figure 3.14 provides a graph of the laboratory analyses for CH_4, CO_2, O_2, Bz, VC and TNMOC for RV Storage Lot shallow SVE testing.

3. During the active SVE phase, the following laboratory trends were observed, as indicated in Figure 3.14:
   - Methane: CH_4 levels increased initially during startup (September 23) from 0.047 percent to 1.3 percent. Levels then decreased to approximately 0.027 percent at shutdown (September 25).
   - Oxygen: O_2 levels increased from 10.3 percent throughout the testing to 20.6 percent at shutdown.

- Carbon Dioxide: CO_2 levels decreased from 4.7 percent, to less than 0.1 percent at shutdown.
- Benzene: Bz levels decreased from approximately 52 ppb at startup to 2.0 ppb at shutdown.
- Vinyl Chloride: VC levels increased initially from 5 ppb during startup to 28 ppb, but then decreased to below the laboratory reporting limit at shutdown.
- Total Non-Methane Organic Compounds: TNMOC levels followed a similar pattern as the Bz levels.

3.5.1.3 Shallow Zone Vapor Well Recovery

1. At the completion of the active SVE activities, the SVE unit was shut down. Samples of the remaining soil gas were collected from the extraction well (SVW-1). SVW-1 was not purged prior to sampling, since purging would not represent the actual soil conditions. The results of this rebound monitoring and sampling are provided in Table 3.23, and shown in Figure 3.35.

2. Figure 3.36 presents the monitoring results (i.e., laboratory) graphically for SVW-1 data.

3. During the rebound monitoring phase, the following laboratory trends were observed, prior to initiating EPA's purging procedure on October 9, 1998:
   - Methane: CH_4 levels remained near zero percent throughout the test.
   - Carbon Dioxide: CO_2 levels slowly increased from near zero percent to approximately 2 percent.
   - Oxygen: O_2 levels decreased gradually from approximately 20 percent to 14 percent.

4. After implementing EPA's purging requirements, the following trends were observed in SVW-1:
   - Methane: CH_4 levels remained near zero percent.
   - Carbon Dioxide: CO_2 levels increased slightly to 2.7 percent.
   - Oxygen: O_2 levels decreased slightly to 11.4 percent.

5. The following was observed during the monitoring of the shallow SVE zone of influence monitoring wells as shown in Figure 3.35:
   - Methane: CH_4 levels remain near zero percent throughout the test.
   - Carbon Dioxide: CO_2 levels remain slightly elevated.
   - Oxygen: O_2 levels remain slightly elevated.

6. Chapter 4 provides a detailed evaluation of the operational, active SVE and rebound monitoring results.

3.5.2 AREA 2 - RV STORAGE LOT SVE TESTING AREA - DEEP ZONE

1. Deep zone SVE testing could not be conducted in the RV storage lot due to perched liquid zones encountered during the installation of the deep extraction well (DVW-1) and deep monitoring probe (DMP)-1.

4.0 FIELD AND LABORATORY SVE DATA EVALUATION

1. Information provided in this chapter evaluates the data presented in Chapter 3.0 of this ROF. Chapter 4.0 is organized in the following manner:
   - 4.1 - SVE Zone of Influence Evaluation
   - 4.2 - SVE GASSOLVE Modeling
   - 4.3 - Soil Gas Recovery and Gas Generation Evaluation
   - 4.4 - SVE Performance Evaluation

4.1 SVE ZONE OF INFLUENCE EVALUATION

1. The zone of influence evaluation for the SVE experiments is provided in terms of concepts, computation methods and limitations of these methods presented in Section 4.1.1. The method of calculating the size of the zone from test data is presented in Section 4.1.2, while the numerical results of the calculations are presented in Section 4.1.3.

4.1.1 INTRODUCTION

1. The zone of influence is the three-dimensional plume within the subsurface throughout which at least a small amount of vacuum is created by the vacuum imposed in the extraction well. The outer boundary of the zone is defined as where gauge pressure falls to zero, and hence the absolute pressure first increases to one atmosphere.

2. The shape of this volume depends on the geometry of the perforated interval in the extraction well and its distance below ground surface. A shallow perforated interval allows air to intrude through the ground surface and flow into the extraction well along with air moving horizontally through the subsurface layer containing the perforated interval (see Figure 4.1). Figure 4.1 shows little flow towards the perforations from the bottom of the extraction well because the layer of soil below the perforated interval is much less permeable than the sump-like material at the WDI site.

3. If the ground surface were also much less permeable than the layer containing the perforated interval, or if the perforated layer were deeper and surrounded top and bottom by impermeable soil layers, the flow pattern during SVE would look similar to the illustration shown in Figure 4.2.

4. The mathematical representation of SVE flow is used on solving the equation of mass continuity through a cylindrical annulus around the extraction well which can be expressed in words as follows:

Mass per unit time –	Mass per unit time =	change in mass
into annulus	out of annulus	per unit time
		within annulus

Solution of this relationship leads to a differential equation whose solution requires several assumptions.

5. Radial symmetry is assumed because of the cylindrical shape of the extraction well. This assumption also requires that the intrinsic permeability be isotropic throughout the zone of influence, which is most likely associated with a constant soil grain size distribution and porosity.

6. To avoid the vertical component of flow shown in Figure 4.1, air intrusion is assumed to be zero, or the SVE layer is assumed to be surrounded on both top and bottom by impermeable soil layers. The result of this assumption is that radius is the only length dimension that serves as an integration variable.

7. Time is removed as a variable by assuming steady state equilibrium. This assumption requires that the rate of removal of mass equal the rate of generation of soil gas within the volume of influence.

8. Solving the basic equation of continuity for a compressible fluid such as soil gas is more difficult than for an incompressible fluid (i.e., water). This is because viscosity and density are both in the equation and are functions of pressure, which is another variable in the equation. To handle these difficulties, viscosity must be assumed to be constant over the small range of pressure involved in SVE, and density must be translated into pressure through the Ideal Gas Law at constant temperature. Hence, the SVE volume of influence must be assumed to be isothermal for the period of each experiment.

9. The assumptions discussed above are needed to solve the equation of continuity in analytical form, but also represent the limitations of applicability for the resulting relationship between pressure, flow and radial distance from the extraction well. Fortunately, the pressure at various radial distances in the SVE zone of influence can be measured in the field, and hence, the distance where the vacuum falls to zero can be estimated.

4.1.2 ZONE OF INFLUENCE CALCULATION

1. The equation that results from solving the equation of mass continuity is the following:

$$\frac{Q}{H} = \pi \frac{k}{u} P_w \frac{\left(1 - \frac{Pa^2}{Pw^2}\right)}{\ln \frac{Rw}{R_I}} \qquad \text{(Equation No. 1)}$$

Where: Q = volume rate of extraction of soil gas [L^3 T^{-1}] (standard cubic feet per minute).

H = length of screened or perforated interval in the extraction well [L] (feet).

k = intrinsic permeability of soil in the SVE layer [L^2] (cm^2, darcy).

u = viscosity (absolute or dynamic) of soil gas [M L^{-1} T^{-1}] (g cm^{-1} sec^{-1}, centipoise).

Pw = pressure (absolute) in the extraction well [M L^{-1} T^{-2}] (in. WC, psia).

Pa = pressure (absolute) of the ambient atmosphere during the SVE test [$ML^{-1}T^{-2}$] (atmospheres, millibars, psia).

Rw = radius of the extraction well [L] (inches).

R_I = radius of (the zone of) influence [L] (feet).

Brackets [ ] give the dimensions of a variable, in which T = time, L = length, and M = mass.

Parentheses ( ) give example units for a variable.

2. Equation 1 can be rewritten to solve for the radius of influence as follows:

$$R_I = R_w \, e^{-\pi \frac{H\,k}{Q\,u} P_w \left(1 - \frac{P_a^2}{P_w^2}\right)} \qquad \text{(Equation No. 2)}$$

The screened interval H is known; the extraction rate (Q) and pressure (Pw) were measured during each SVE test; viscosity was taken from the literature; and atmospheric pressure (Pa) was obtained from the National Weather Service. Intrinsic permeability was independently computed by application of the GASSOLVE model to the SVE test data as discussed in Section 4.2.

3. The screened interval was 3 feet in the fill (shallow) layer and 10 feet in the native soil layer. The radius of the extraction well was approximately 4 inches. The viscosity of the soil gas was assumed to be equal to that of air at one atmosphere (i.e., 1.8×10^{-4} grams per centimeter per second or poise).

4.1.3 ZONE OF INFLUENCE CALCULATION AND RESULTS

1. As discussed in Section 4.1.1, various methods have been used to evaluate the potential zone of influence by SVE. As indicated, the most practical method to estimate the zone of influence is to graph the observed vacuum versus the radial distance from the SVE extraction well.

2. Using the observed vacuum levels from the various monitoring points, the data was plotted for each area. Table 4.1 provides a summary of the estimated zones of influence by area. The calculations are provided in Appendix C.

3. Based on the estimated zone of influences presented in Section 4.1.2, the following was observed in relation to the SVE zone of influence:
   - Shallow areas demonstrated limited zones of influence due to the following conditions:
     - Shallow soils were affected by vertical air infiltration.
     - Shallow soils are more prone to preferential pathways, which can reduce the effective zone of influence.
   - Deep zones demonstrated larger calculated zones of influence ranging from 122 feet to 200 feet. The observed larger zones of influence in the deep soils are likely due to the following reasons:
     - Local lithology of deep zones indicate a potential higher permeability.
     - The deep SVE zones were covered by a low permeable waste layer which acts to increase the effective vacuum by preventing vertical leakage during SVE.
     - The native soils in the deep SVE test are less likely to exhibit preferential flow due to utilities or other disturbances, as compared to the shallow soils.

4. Based on the SVE data presented in Chapter 3.0, and the zone of influence calculations presented above. The TM No. 9A results indicate that SVE using conventional extraction techniques (i.e., <100 in. WC) and equipment was able to:

- Generate a zone of influence of greater than 30 feet in the shallow fill soils.
- Generate a substantially greater zone of influence, ranging from 122 to up to 200 feet in the deep native soils.

5. It is unlikely that an effective zone of influence of 200 feet could be achieved in the field. These are estimations only, and in actual operating conditions zones of influence of 80 to 150 feet are typical.

4.2 SVE GASSOLVE MODELING

4.2.1 INTRODUCTION

1. To further evaluate the SVE data, the U.S. Army Corp. of Engineers recommend using an SVE model called GASSOLVE, which was developed by Clemson University. The focus of this model is to calculate the intrinsic permeability of the soil, using various SVE data inputs, and assumptions and default parameters. The GASSOLVE model calculates the intrinsic permeability, both horizontally and vertically, along with a statistical evaluation of error range of the permeability estimate.

2. Intrinsic permeability (*k*) is a property of a porous medium that expresses how easily a fluid can move through the pores between the grains. The dimensions of *k* are length squared, usually expressed in units of square centimeters of darcies, (1 darcy = 10^{-8} cm^2). Fluid conductivity is a property of both the porous medium and the specific fluid moving through it. The relationship between fluid conductivity and intrinsic permeability is given by the following expression:

$$K = \frac{kpg}{u} \qquad \text{(Equation No. 3)}$$

Where: K = conductivity of a specific fluid in a specific porous medium [LT^{-1}] (cm/sec).
p = density of the fluid [ML^{-3}] (g cm^{-3}).
g = acceleration of gravity [LT^{-2}] (cm/sec^{-2}).

4. Equation 3 assumes that the pores of the medium are saturated with the specified fluid (i.e., water). If the fluid is a gas, such as at WDI, and is moving through an unsaturated

layer of soil, the analytical relationship for gas conductivity must also take into account the water in the pores. This relationship is derived in Appendix D. Rearranging Equation 3 to find intrinsic permeability in terms of fluid conductivity and moisture content, we obtain the following expression from Appendix D:

$$k = \frac{\mu_a}{p_a g} Ka(\Theta_{mg})e \qquad 6.9\Theta mg\left(\frac{1-\Phi}{\Phi}\right)\frac{p_s}{p_w} \qquad \text{(Equation No. 4)}$$

Where Θmg = moisture content of soil [ ] (%).

Φ = porosity of the medium [-] (%).

ps = density of the solid particles in the porous medium [ML^{-3}] (g cm^{-3}).

pw = density of water [ML^{-3}] (g cm^{-3}).

5. To calculate the intrinsic permeability, using the GASSOLVE model, the parameters and default values shown in Table 4.2 were used.

6. The GASSOLVE model produces the following output parameters:
   - Horizontal Permeability ($meters^2$)
   - Vertical Permeability ($meters^2$)
   - Residual Sum of Squares
   - Average Error (%)

7. The computation of intrinsic permeability using GASSOLVE was independently checked through laboratory measurements on soil samples and calculation according to Equation 4. Each soil sample was subject to a Darcy-type experiment in which fluid (air) was pushed through the samples by a measured pressure difference. The resulting extraction flow was measured and used to compute effective gas (air) conductivity. This calculation of gas conductivity is included as Appendix D.

8. The moisture content of the soil samples was combined with the calculation of effective gas conductivity to calculate intrinsic permeability, which is a property of the porous medium, not of the fluid moving through it (see Appendix D). The laboratory based calculation of *k* is lower than that computed with GASSOLVE by a factor of 16. This difference is small in the context of the uncertainties in the data measured in the SVE tests (and used in GASSOLVE) and in the laboratory for Darcy flow through soil samples. For example, Appendix D shows that the dependence of air conductivity on moisture content varies by three orders of magnitude.

4.2.2 GASSOLVE MODELING RESULTS

1. Using the parameters listed in Table 4.2, Table 4.3 provides a summary of the GASSOLVE results by area.

2. As shown in Table 4.3, the GASSOLVE results for the shallow SVE tests indicate the following:

   - **Horizontal Permeability:** Permeabilities ranged from 1.8 x 10^{-8} m^2 in Brothers (Area 5), to 6.2 x 10^{-12} m^2 in Area 7. This indicates a generally low permeable soil type consistent with silty sands.
   - **Vertical Permeability:** Vertical permeabilities for the shallow soils were generally on the same order of magnitude as the horizontal permeability, indicating significant surface leakage.
   - **Average Error:** Average errors were generally low, with the exception of Brothers (Area 5). The average error in Area 5 was 33.6 percent. This appears to be due to variations in vacuum levels during testing.

3. A detailed summary of the GASSOLVE model results for the shallow SVE tests is provided in Appendix E.

4. Table 4.4 provides a comparison of the calculated intrinsic permeabilities and the local lithology from the extraction and monitoring well logs. As shown in Table 4.4, the results of the shallow GASSOLVE modeling compare relatively well to the local soil conditions.

5. As shown in Table 4.3, the GASSOLVE results for the Deep SVE tests indicated the following:

   - **Horizontal Permeability:** Permeabilities ranged from 5.4 x 10^{-11} m^2 at C&E Die to 8.9 x 10^{-11} m^2 in Brothers (Area 5). This indicates a slightly more permeable soil type relative to the shallow soils, but is still considered a low permeability soil type.
   - **Vertical Permeability:** Vertical permeabilities were generally 2 to 4 orders of magnitude lower than the horizontal permeabilities, indicating only marginal air leakage from the surface.
   - **Average Error:** Average errors were very low (e.g., less than 5 percent).

6. A detailed summary of the GASSOLVE model results for the deep SVE tests is provided in Appendix F.

7. Table 4.4 provides a comparison of the calculated intrinsic permeabilities and the local lithology as discussed above. As shown in Table 4.4, the results of the GASSOLVE modeling compare relatively well to the local soil conditions.

4.3 SOIL GAS RECOVERY AND GAS GENERATION EVALUATION

1. One of the objectives of the SVE testing was to determine the CH_4 generation rate at various locations. By determining the CH_4 generation rate, an evaluation of the ability of various techniques to control gas migration could be completed.

2. To initially determine the CH_4 generation rate, a calculation using the available site data was submitted to EPA in February 1998. This calculation will be discussed further in Section 4.3.2.

3. To further refine the CH_4 generation rate, the recovery of the gas levels in the SVE areas was monitored over time, as presented in Chapter 3.0. The remainder of this section presents an evaluation of the recovery data and methane gas generation rates.

4.3.1 SOIL GAS RECOVERY

1. During the soil gas recovery monitoring, the SVE treated areas appeared to go through three phases. These phases were as follows:
   - **No Activity:** After discontinuation of the active SVE, the gas levels (e.g., CH_4, CO_2 and O_2) remained relatively stable.
   - **Aerobic Phase:** During this phase the wells showed increasing levels of CO_2, and slightly decreasing O_2 levels. This trend appears consistent with aerobic degradation of petroleum hydrocarbons in the soil.
   - **Anaerobic Phase:** After CO_2 levels increased and oxygen levels decreased, low levels of CH_4 were observed to gradually increase. This is consistent with anaerobic degradation of petroleum hydrocarbons.

2. Table 4.5 provides a summary of the soil gas levels at the time of SVE shutdown, and the final soil gas recovery monitoring conducted in January 1999.

3. As shown in Table 4.5, the following trends were observed:
   - Shallow Soils:
     - Shallow soils demonstrated very low CH_4 levels and slightly elevated CO_2.
     - O_2 level decreased during the rebound monitoring as anticipated.
   - Deep Soils:
     - CH_4 levels increased only slightly during rebound monitoring as compared to the shutdown levels.
     - O_2.level decreased in all areas except Area 8, which is consistent with biodegradation. Area 8 O_2 level increased slightly.
     - CO_2 levels increased in all areas except Area 8, which is also consistent with biodegradation. The CO_2 levels in Area 8 decreased slightly.

4.3.2 GAS GENERATION EVALUATION

1. Three different approaches have been used to estimate the rate of gas generation at the site. A fundamental calculation of the rate at which CH_4 is generated by anaerobic decomposition is discussed first, with details of the calculation included in Appendix G. Appendix G also includes a comparison of the theoretical rates with flux box measurements and calculations made in 1995. The calculation in Appendix G was transmitted to the EPA on February 13, 1998 (TRC, 1998).

2. SVE test data were used to calculate CH_4 generation, based on the concentration in the extraction flow rate. The CH_4 generation rate was calculated separately for SVE tests in the shallow fill layer (see Section 4.3.2.1) and in the deep native soil layer (see Section 4.3.2.2). These generation rates were compared with the fundamental calculation discussed next.

3. The potential rate at which gas is generated in the sump-like material layer was first evaluated on a theoretical basis, using the anaerobic reactions that decompose petroleum hydrocarbons and other organic compounds. As shown in Appendix G, the sump-like materials below the cover fill layer were represented by a generic alkane, whose size, $C_{24.5}H_{51}$, is midway in the range of hydrocarbons found at the site. This layer of sump-like materials is assumed to be the only source of significant gas generation.

4. The same first order kinetics model is used that was developed to estimate the generation of landfill gas from organic wastes undergoing anaerobic decomposition in a municipal solid waste landfill. This model mathematically simulates the generation of CH_4 in anaerobic

decomposition as an exponentially decreasing function characterized by a rate constant or half-life $\tau\left(\tau = \frac{In2}{k}\right.$, where k = rate constant in inverse years $\Big)$. This same model is used by EPA in their New Source Performance Standard for municipal solid waste landfills (EPA, 1996), and has been verified on independent landfill gas data at three different landfills. The half-life for the anaerobic decomposition is assumed to be quite long, 50 years, because the period during which petroleum-based wastes were disposed at the site lasted for about a decade, ended in 1954, and yet is continuing to slowly generate CH_4.

5. The representative hydrocarbon is assumed to anaerobically decompose into CH_4 and CO_2 as follows:

$$C_{24.5}H_{51} + 11.75\ H_2O \xrightarrow{\text{anaerobic}} 18.625\ CH_4 + 5.875\ CO_2$$

Based on the amount of total petroleum hydrocarbons measured in the sump-like material (i.e., 12,1843 mg/kg), the ultimate or total yield of CH_4 from a unit mass would be 0.25 standard cubic feet (scf) per pound.

6. Application of the model to the conditions at WDI leads to a CH_4 generation rate of 3.3×10^{-6} scf per minute (scfm) per square foot of surface area above the layer of sump-like materials, or 2.4 scfm of CH_4 from the entire 16.7 acre area underlain by sump-like materials. If the half-life were shorter than 50 years, such as 25 years, the overall methane generation rate would only increase to 2.5 scfm.

7. Flux box measurements made in 1995 are included in Appendix G, and indicated that the arithmetic mean and maximum CH_4 emission rates from the 16.7 acre area of ground surface were 0.18 and 0.28 scfm, respectively. These rates are equivalent to surface fluxes of 2.5×10^{-7} and 3.8×10^{-7} scfm/ft^2, respectively.

4.3.2.3 Overall Site Gas Model

1. A combination of theoretical principles and empirical field evidence have been used to create a working hypothesis of gas generation and migration at the site. The SVE tests were designed to test the ability of the hypothesis to explain field observations, while determining if this technology could cost-effectively reduce subsurface concentration of CH_4 and other constituents (e.g., Bz, VC). The following description of a site gas model is consistent with

observations made at the site, and can be helpful in designing a remedial action that accomplishes defined goals.

2. Sump-like materials are contained in a layer less than 15 feet in thickness, and overlain by a 5- to 10-foot thick layer of fill material. The sump-like materials were placed at the site during a ten year period, from approximately 1944 through 1954. The oxygen in the pores of this layer was consumed by initial aerobic decomposition of the organic material, producing water and CO_2. Thereafter, the lack of O_2 allowed the layer to become anaerobic. Anaerobic decomposition has been producing CO_2 and CH_4 ever since, along with trace amounts of other organics, including chlorinated compounds.

3. The rate of decomposition, and hence, generation of these gases, is expected to follow first order chemical kinetics. In this chemical reaction model, the rate of decomposition is proportional to the amount of organic material remaining. The half-life of the remaining organic material is estimated to be in the range of 25 to 50 years. The resulting gas generation rate is low, but continues for a long period of time.

4. The generated gas migrates slowly by diffusion from the higher concentrations within the sump-like materials to lower concentrations in the native soil beneath and in the fill layer above. The volume of gas generated in the sump-like materials creates a slightly higher pressure than outside the layer, which creates a very small advective flow. Field observations and calculations (TRC, 1998) indicate that advective flux upwards towards the surface is between 1/14 and 1/700 of the diffusive flux.

5. Migration of gas from the sump-like material layer downwards into the native soil beneath is approximately 2×10^{-6} scfm CH_4 per square foot (see Section 4.3.2). This rate is most likely inconsequential because it is directed away from the ground surface and people working above in local business enterprises. Monitoring data indicate that there is also no downward flux capable of contaminating ground water, which is at a depth of approximately 35 feet, at least 10 feet below the sump-like material layer.

6. Migration of gas from the sump-like material upwards into the fill appears to be even lower, amounting to only about 8×10^{-7} scfm CH_4 per square foot (see Section 4.3.2.2). This low upward flux was measured to be even lower from the ground surface. Along the route of migration, especially near the surface, some of the CH_4 may be aerobically decomposed, potentially accounting for the lower surface flux.

7. Methane can collect in certain probes at high concentrations, but should not be misinterpreted as an indication of a high generation rate or high migration rate towards the surface. These high concentrations in small spaces can be caused by the following processes. Anaerobic decomposition generates both CH_4 and CO_2 in approximately equal amounts. These gases migrate both downwards and upwards. The upward migrating gas passes through sump-like materials, which contains a large amount of clay (i.e., approximately 75 percent), and fill material, which contains some clay (i.e., approximately 5 percent). The clay is capable of removing CO_2 as the gas migrates upwards, leaving mostly CH_4 to collect in a few specific probes. The flux of CH_4 is still just as small as has been indicated by theoretical calculation and SVE tests (approximately 3 10^{-6} scfm CH_4 per square foot), but it is capable of collecting in the small volumes of these monitoring probes.

8. Overall, the low gas generation rate in the sump-like material is incapable of causing enough upward or outward migration of CH_4 and other constituents to be a health risk to people working in onsite businesses or offsite residences, schools, etc. This low flux is easily captured in a horizontal gas collector (e.g., geotextile, geogrid, geonet) and routed out from under buildings. The flux is also so low that it can be safely vented to the atmosphere rather than requiring a gas destruction system.

4.4 SVE PERFORMANCE EVALUATION

4.4.1 SVE AIR FLOW EVALUATION

1. As part of the evaluation of SVE as a gas control technology, the air flow rates from the extraction wells were monitored. The data in Chapter 3.0, indicate the air flow rates from the extraction wells during active SVE.

2. The objective of the treatability testing was to evaluate the performance of SVE under field conditions. As part of the treatability study, the following performance characteristics were evaluated:
   - Well extraction performance characteristics (i.e., step tests).
     - Step testing was attempted, but was not considered crucial, since the existing vapor well design has clearly established the well design characteristics and capabilities.
   - In situ air permeability.
     - This was determined using the GASSOLVE modeling discussed in Section 4.3.

- Well gas and effluent gas contaminant concentrations.
- Potential effects of SVE on local conditions such as ground water.

3. To evaluate the SVE performance, constant rate performance testing was used. Constant rate performance tests are conducted under steady-state conditions to ensure that a representative area of influence is obtained. Figures 4.3 through 4.11 provide a comparison of the vapor extraction flow for the corrected well head flow. As shown in these figures, relatively stable flow conditions were produced. One exception was the shallow Area 7 wells, which exhibited very low corrected flows due to the low permeability of the soils.

4. Based on the results of the zone of influence modeling, the GASSOLVE modeling of the gas recovery data presented is discussed in Section 4.2. The objective of the SVE Performance evaluation has been achieved. This includes:
   - Well extraction characteristics.
     - Sufficient data was obtained on wellhead flow and vacuum to allow, if necessary, for design of a SVE system.
     - Sufficient data was obtained on the well characteristics to evaluate the feasibility of SVE, for remedial selection purposes.
   - In situ air permeability.
     - Sufficient air permeability data was collected in five distinct site areas and at two depths as indicated by the GASSOLVE modeling results.
   - Well gas at effluent gas constituent concentrations.
     - Sufficient data was generated on the soil gas characteristics to allow, if necessary, the design of a SVE system as part of a remedial action.
   - Potential effects of SVE on local conditions.
     - No effects were observed on ground water levels in the test area.

5. Based on the results of the modeling and the zone of influence results, SVE has shown the site to provide sufficient vacuum and air flow to prevent or control migration of soil gas constituents.

4.4.2 GAS RECOVERY ESTIMATES

1. As part of the TM No. 9A evaluations, an estimate of the mass of contaminants removed during SVE activities was calculated using the method indicated in *Soil Vapor Extraction and Bioventing*, U.S. Army Corps of Engineers (EPA 1110-1-4001, November 1995).

2. Using this method, an estimate of the mass of CH_4, Bz and VC extracted during treatment was developed as indicated in Table 4.6. As indicated in Table 4.6, the mass removal estimates indicated the following:

- Shallow Soils:
  - CH_4 removal ranged from 0.14 lbs in Area 5 to 4.2 lbs in Area 7.
  - Bz removal ranged from 0 lbs in Areas 5 and 8 to 7 x 10^{-5} lbs at C&E Die.
  - VC removal ranged from 0 lbs in Areas 7, 8 and 5 to 2 x 10^{-5} lbs at C&E Die.
- Deep Soils:
  - CH_4 removal in the deep soils was significantly greater than in the shallow soils. Removal levels ranged from 0.17 lbs in Area 8 to 977 lbs in Area 5. As shown in Table 4.6, both Area 5 and C&E Die yielded substantially larger masses of CH_4 than the other areas. This is consistent with the levels of CH_4 observed during active SVE.
  - Bz removal in the deep soils was consistent with the shallow soil results. Removal masses ranged from 0 to 0.019 lbs in Area 5.
  - VC removal from the deep soils was also consistent with the shallow soils removal levels. Removal levels ranged from 0 to 0.0128 lbs in Area 5.

3. Based on this data, SVE technologies such as the system used during TM No. 9A can be used to extract a limited mass of contaminants (i.e., CH_4) under typical operating conditions. As shown in Table 6, the mass removal of contamination in the Shallow Zone, which is adjacent or under the onsite buildings, was minimal.

4.4.3 SVE GAS TREATMENT EVALUATION

1. As part of the overall evaluation of SVE as a potential Remedial Technology for gas control at the WDI site, an evaluation of the offgas treatment technology was included as one of the overall objectives. Treatment technologies for CH_4 and VOC containing gas streams include the following:

- Direct emission or release.
- Adsorption into carbon.
- Incineration:
  - Incineration using controlled temperature, air flow.
  - Incineration using direct combustion such as flares.
- Catalytic oxidation.

2. To facilitate TM No. 9A, a catalytic oxidizer was used to treat the effluent soil gas stream. The catalytic oxidizer was selected due to its portability and due to the range of its capabilities in treating a wide variety of gases. It is important to note that it was not necessary to test each of the above treatment technologies during TM No. 9A. By collecting data on the gas stream during TM No. 9A, sufficient data was collected to allow design of the most appropriate treatment process during the RD.

3. Treatment or destruction efficiency observed during the above SVE activities ranged from 0 to approximately 60 percent. Appendix G provides the destruction efficiency calculations These levels are relatively lower than anticipated. Although the destruction efficiency was low, there were no significant release of soil gas constituents to the atmosphere. The reasons for the lower-than-expected treatment levels may include the following:

   - **Low Contaminant Concentrations:** The actual mass of contaminants extracted was relatively low in comparison to typical SVE sites, such as USTs and gasoline station cleanup. As the concentration of the gas stream decreases, generally the destruction efficiency also decreases.
   - **Low Oxygen Concentrations:** O_2 is required to be present in the gas stream for a catalytic oxidizer to perform optimally. In most of the test areas, O_2 levels were generally low (i.e., C&E Die, deep testing), which may have prevented or reduce the efficiency of the catalytic oxidizer. Intake air, added to the air stream is designed to increase O_2 levels and improve treatment.
   - **Catalytic Oxidizer Temperature:** The catalytic oxidizer temperature may have been too low to initiate to oxidation reaction, given low O_2 levels and low constituent levels.

4. Based on these results, prior to the design of any gas treatment system for the WDI site, further evaluation of the gas treatment technologies will be required. However, sufficient data was collected during the TM No. 9A activities, to allow a design without further field activities.

5.0 SVE FEASIBILITY EVALUATION

1. The purpose of the treatability was to collect data to satisfy the following objectives:
   - Determine air conductivity in each layer adjacent to the gas-producing sump-like material layer.
   - Estimate the SVE radius of influence.
   - Evaluate long-term soil gas concentrations including rebound.
   - Evaluate condensate production.
   - Evaluate air handling and treatment effectiveness.

   Table 5.1 provides a summary of the results of the data evaluation presented in Chapter 4.0.

2. The remainder of this section provides an evaluation of the feasibility of SVE in achieving the remedial objectives at the WDI site. Furthermore, this section provides an evaluation of passive bioventing to achieve the remedial objectives, based on the data obtained during TM No. 9A activities.

3. Table 5.2 provides a summary of the current Field Sampling (FS) alternatives for soil gas, as presented in the revised Chapter 7.0 Feasibility Study tables submitted to EPA on January 7, 1999. Table 5.3 provides a summary of the remedial alternatives evaluated and the results of the preliminary FS screening by site area.

5.1 SVE TECHNOLOGY EVALUATION

1. The objective of performing the TM No. 9A treatability study was to obtain additional data with which to evaluate the feasibility of SVE. Formal remedial objectives have not been established for the WDI site.

2. To evaluate the effectiveness of SVE, the following risk-based remedial objectives were used:
   - CIWMB CH_4 standards:
     - Site boundary CH_4 levels are to be less than 5 percent.
     - CH_4 levels under or adjacent to structure are to be less than 1.25 percent.
   - Interim action level established for VC and Bz in soil gas (Tables 5.3 and 5.4):
     - Bz levels are to be less than 2,000 ppb.
     - VC levels are to be less than 250 ppb.

3. Table 5.4 provides an evaluation of the feasibility of SVE to achieve the above remedial objectives, and comply with the NCP criteria for the selection of remedial alternatives at CERCLA sites.

4. As indicated in Table 5.4, SVE has been shown during the TM No. 9A treatability study to be effective in reducing soil gas levels outside the reservoir and in areas adjacent to onsite buildings. TM No. 9A has developed sufficient data to complete the Feasibility Study process of evaluating SVE as a potential soil gas remedial alternative.

5.2 PASSIVE BIOVENTING EVALUATION

1. As addressed in Section 4.2, the use of passive bioventing has been considered as an alternative remedial alternative for soil gas at the WDI site. Passive bioventing uses changes in local atmospheric pressure to passively increase the O_2 content of subsurface soils, using a combination of vapor wells and check valves. Additional details on the components and design of a passive bioventing system are described in (Passive Soil Vapor Extraction, 1997) and will be addressed as part of the Feasibility Study.

2. By increasing the O_2 content of the soils, biological degradation of the hydrocarbons is enhanced reducing the potential of anaerobic degradation (i.e., CH_4 generation) and reducing the mass of the hydrocarbon source through biodegradation.

3. Table 5.4 provides a preliminary evaluation of the feasibility of passive bioventing to achieve the remedial objectives described above and comply with the National Contingency Plan (NCP) criteria for the selection of remedial alternatives.

4. As discussed in Table 5.4, a preliminary evaluation of passive bioventing, given the TM No. 9A results, indicates that it may be feasible at the WDI site. The potential feasibility of bioventing is based on the following observations.
   - Intrinsic permeability calculations for the shallow and deep soils are within the published range for passive bioventing to occur.
   - Biological degradation appears to occur at the site where subsurface O_2 levels are increased, as shown by the observed increase in CO_2 levels during rebound monitoring.

- The long-term levels of constituents in the extracted soil gases are not sufficiently high enough to warrant extensive treatment.
- The cost effectiveness of passive bioventing may be advantageous in reducing the cost for soil gas remedial activities.

5. The feasibility of passive bioventing will be addressed in more detail as part of the Feasibility Study, which is currently in process.

6.0 REFERENCES

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Tables

TABLE 2.1

SVE TESTING
SAMPLING AND ANALYSIS SCHEDULE
WASTE DISPOSAL, INC. SUPERFUND SITE

TEST	FIELD PARAMETERS			LABORATORY SAMPLING[1]	
	Parameter	Method	Frequency	Method	Frequency
Startup and Step Testing (0-8 hours)	CH_4	FID/PID	Initially, then hourly for the first 8 hours (i.e., at the start, midpoint and end of each 2-hour step test)	EPA 25.C	Every 2 Hours
	TNMOC	FID/PID		EPA 25.C, TO-14	
	O_2	GEM 500		Electrochemical Cell	
	CO_2	GEM 500		NDIR	
	Vacuum Flow	Magnahelic/Pitot tube		Field Only	
	Benzene	GC/FID		TO-14	
	Vinyl Chloride	GC/FID		TO-14	
	Volatile Organics	GC/FID		TO-14	
Initial Operations (8-48 hours)	CH_4	FID/PID	Every 4-6 Hours	EPA 25.C	Every 12 Hours
	TNMOC	FID/PID		EPA 25.C, TO-14	
	O_2	GEM 500		Electrochemical Cell	
	CO_2	GEM 500		NDIR	
	Vacuum Flow	Magnahelic/Pitot tube		Field Only	
	Benzene	GC/FID		TO-14	
	Vinyl Chloride	GC/FID		TO-14	
	Volatile Organics	GC/FID			
Continued Operations (48 hours to Shutdown)	CH_4	FID/PID	Monitor Daily	EPA 25.C	Every 24 Hours (up to 7 days)
	TNMOC	FID/PID		EPA 25.C, TO-15	
	O_2	GEM 500		Electrochemical Cell	
	CO_2	GEM 500		NDIR	
	Vacuum Flow	Magnahelic/Pitot tube		Field Only	
	Benzene	GC/FID		TO-14	
	Vinyl Chloride	GC/FID		TO-14	
	Volatile Organics	GC/FID		TO-14	
Shutdown	CH_4	FID/PID	At Shutdown	EPA 25.C	One Sample (at shutdown)
	TNMOC	FID/PID		EPA 25.C, TO-15	
	O_2	GEM 500		Electrochemical Cell	
	CO_2	GEM 500		NDIR	
	Vacuum Flow	Magnahelic/Pitot tube		Field Only	
	Benzene	GC/FID		TO-14	
	Vinyl Chloride	GC/FID		TO-14	
	Volatile Organics	GC/FID		TO-14	
Post Shutdown	CH_4	FID/PID	Daily First 3 Days; Monitor Every 3 Days to 14 Days	EPA 25.C	Daily First 1-3 Days; Monitor every 3 Days for up to 14 Days
	TNMOC	FID/PID		EPA 25.C, TO-14	
	O_2	GEM 500			
	CO_2	GEM 500			
	Vacuum Flow	Magnahelic/Pitot tube		Field Only	
	Benzene	GC/FID		TO-14	
	Vinyl Chloride	GC/FID		TO-14	
	Volatile Organics	GC/FID		TO-14	

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(1) Samples were collected in summa - canisters

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TABLE 2.2

DEVIATIONS FROM ORIGINAL WORKPLAN
WASTE DISPOSAL, INC. SUPERFUND SITE

WORKPLAN FIELD MODIFICATION	RATIONALE FOR MODIFICATION	EFFECT ON DATA/TESTING
Elimination of Deep SVE Testing - RV Lot Area 2.	Perched ground water in the area prohibited installation of the deep wells.	No significant effect on TM No. 9A interpretation, since deep SVE was tested in four other areas.
Step testing was not accomplished in each area.	Equipment limitations and low soil vacuum level limited the ability to perform step testing.	Data on the optimal performance conditions for the extraction well may not have been collected. Results will not affect the evaluation of the feasibility or effectiveness of SVE.
SVE recovery phase well purging addition.	Due to area leaks or short circuits to the surface, the extraction well data may have been showing high oxygen levels. EPA requested the wells be purged prior to sampling. Purging of the wells artificially disturbs the post SVE conditions, and may skew the data toward more anaerobic conditions.	Purging of the wells appears to have shown slightly lower oxygen levels and some increase in methane levels. However, this change does not appear to have affected the data interpretation.

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TABLE 3.1

PRE- AND POST-PURGING EXTRACTION WELL RESULTS
WASTE DISPOSAL, INC. SUPERFUND SITE

	PRE-PURGE SOIL GAS RESULTS				POST-PURGE SOIL GAS RESULTS			
	CH_4 (%)	O_2 (%)	CO_2 (%)	VOCs (ppm)	CH_4 (%)	O_2 (%)	CO_2 (%)	VOCs (ppm)
Area 5 - Brothers								
• DVW-1	0.3	14.6	3.2	3,450	3.0	7.9	7.0	NM
• SVW-1	0.0	12.4	1.7	2,080	0.2	9.3	2.7	NM
C&E Die								
• DVW-1	1.1	17.7	8.3	<1	2.7	13.3	4.5	NM
• SVW-1	0.3	20.1	1.1	1,025	0.2	13.2	5.7	NM
Area 7								
• DVW-1	0.0	21.4	0.0	440	0.0	20.9	0.0	NM
• SVW-1	0.0	20.8	1.5	680	0.4	0.0	10.0	NM
Area 8								
• DVW-1	0.0	19.7	0.3	860	0.0	20.5	0.4	NM
• SVW-1	0.0	20.4	0.1	710	0.1	3.6	14.4	NM
Area 2 - RV Storage Lot								
• SVW-1	0.0	17.7	0.2	655	0.0	10.1	4.6	NM

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NM = Not measured
ppm = parts per million
DVW = Deep Vapor Well
SVW = Shallow Vapor Well

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TABLE 3.2

AREA 5 - BROTHERS MACHINE SHOP
SVE START-UP OPERATIONAL PARAMETERS
WASTE DISPOSAL, INC. SUPERFUND SITE

PARAMETERS	SHALLOW WELL					DEEP WELL					AIR INJECTION VENTS (AIV)			
	SVW-1	SVP-1	SMP-1	SMP-2	SMP-3	DVW-1	DVP-1	DMP-1	DMP-2	DMP-3	AIV-1	AIV-2	AIV-3	AIV-4
	7/15/98; 0830	7/15/98; 0830	7/15/98; 0830	7/15/98; 0830	7/15/98; 0830	7/20/98; 0800	7/20/98; 0800	7/20/98; 0800	7/20/98; 0800	7/20/98; 0800	7/20/98; 0800	7/20/98; 0800	7/20/98; 0800	7/20/98; 0800
Wellhead Vacuum (Inches)	-0.30	-0.12	-0.02	-0.06	-0.07	-2.0	-0.74	-0.42	-0.44	-0.27	-0.44	-0.46	-0.44	-0.52
Well Flow (Cfm)	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
Recycle Air (%)	25	- -	- -	- -	- -	35	- -	- -	- -	- -	- -	- -	- -	- -
Make Up Air (%)	30	- -	- -	- -	- -	40	- -	- -	- -	- -	- -	- -	- -	- -
Catalyst Temperatures (°C)														
• Inlet	725	- -	- -	- -	- -	725	- -	- -	- -	- -	- -	- -	- -	- -
• Center 1	742	- -	- -	- -	- -	755	- -	- -	- -	- -	- -	- -	- -	- -
• Center 2	739	- -	- -	- -	- -	760	- -	- -	- -	- -	- -	- -	- -	- -
• Outlet	710	- -	- -	- -	- -	753	- -	- -	- -	- -	- -	- -	- -	- -

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- - = Not monitored

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TABLE 3.3

SUMMARY OF FIELD AND LABORATORY DATA FOR BROTHERS - SHALLOW ZONE SVE TEST ACTIVE PHASE
WASTE DISPOSAL, INC. SUPERFUND SITE

MONITORING LOCATION	DATE/TIME	(Initial) 7/14/98; 1300	7/15/98; 0830		7/15/98; 1200		7/15/98; 1400		7/15/98; 1600		7/15/98; 1700		7/16/98; 0900		7/16/98; 1600		7/17/98; 0900		7/17/98; 1400	
	PARAMETERS	FIELD	FIELD	LAB	FIELD	LAB	FIELD	LAB	FIELD	LAB	FIELD	LAB	FIELD	LAB	FIELD	LAB	FIELD	LAB	FIELD	LAB
EXTRACTION WELL (SVW-1)	CH_4(%)	**0.2**	**0.2**	**0**	**0.2**	**0.03**	**0.2**	**0.01**	**0.2**	**0.01**	**0.2**	**0.01**	**0.0**	**0.002**	**0.2**	**0.0009**	**0.0**	**0.0004**	**0.2**	NM
	TNMO (ppm)	NM	NM	**1,050**	NM	**131**	NM	**88**	NM	**60**	NM	**61**	NM	**35**	NM	**64**	NM	35	NM	NM
	O_2(%)	**9.3**	**9.0**	**9.4**	**6.5**	**5.7**	**5.8**	**6.4**	**6.2**	**6.8**	**6.7**	**7**	**8.8**	**8.7**	**9.7**	**9.4**	**11.6**	**10.2**	**5.5**	NM
	CO_2(%)	**2.7**	**2.7**	**2.8**	**6.9**	**7.6**	**7.1**	**7.3**	**7.1**	**7.1**	**6.8**	**7**	**6.1**	**6.4**	**5.5**	**6.2**	**4.9**	**6.1**	**8.4**	NM
	Benzene (ppb)	NM	NM	<7	NM	<7	NM	<7	NM	<7	NM	<6	NM	<0.8	NM	<0.8	NM	<0.8	NM	NM
	Vinyl Chloride (ppb)	NM	NM	<7	NM	<7	NM	<7	NM	<7	NM	<6	NM	<0.8	NM	<0.8	NM	<0.8	NM	NM
	Total Organics (ppb)	NM	NM	**532**	NM	**2,735**	NM	**1,078**	NM	**874**	NM	**580**	NM	**120**	NM	**3,658.3**	NM	**155**	NM	NM
	TCE (ppb)	NM	NM	<7	NM	<7	NM	<7	NM	<7	NM	<6	NM	<0.8	NM	<0.8	NM	<0.8	NM	NM
	PCE (ppb)	NM	NM	**8**	NM	**11**	NM	**8**	NM	**8**	NM	< 6	NM	**11.3**	NM	**10.5**	NM	**7.4**	NM	NM
POST BLOWER	CH_4(%)	NM	NM	NM	**0.3**	**0.0006**	**0.2**	**0.0004**	**0.2**	**0.0003**	**0.2**	**0.0005**	**0.0**	**0.0003**	**0.2**	**0.0002**	**0.0**	**0.0003**	**0.0**	NM
	TNMO (ppm)	NM	NM	NM	NM	**9**	NM	**7**	NM	**7**	NM	**6**	NM	**9**	NM	**9**	NM	**9**	NM	NM
	O_2(%)	NM	NM	NM	**21.1**	**20.5**	**20.5**	**20.5**	**20.6**	**20.5**	**20.8**	**20.5**	**20.3**	**20.5**	**21.1**	**20.6**	**20.2**	**20.5**	**20.1**	NM
	CO_2(%)	NM	NM	NM	**0.0**	**0.15**	**0.0**	**0.15**	**0.0**	**0.15**	**0.0**	**0.15**	**0.0**	**0.15**	**0.0**	**0.153**	**0.0**	**0.16**	**0.1**	NM
	Benzene (ppb)	NM	NM	NM	NM	<6	NM	<6	NM	<0.9	NM	<6	NM	<0.7	NM	<0.8	NM	<0.8	NM	NM
	Vinyl Chloride (ppb)	NM	NM	NM	NM	<6	NM	<6	NM	<0.9	NM	<6	NM	<0.7	NM	<0.8	NM	<0.8	NM	NM
	Total Organics (ppb)	NM	NM	NM	NM	**203**	NM	**99**	NM	**98.5**	NM	**43**	NM	**35.1**	NM	**51.1**	NM	**33.7**	NM	NM
	TCE (ppb)	NM	NM	NM	NM	<6	NM	<6	NM	<0.9	NM	<6	NM	<0.7	NM	<0.8	NM	<0.8	NM	NM
	PCE (ppb)	NM	NM	NM	NM	<6	NM	<6	NM	<0.9	NM	<6	NM	<0.7	NM	<0.8	NM	<0.8	NM	NM
STACK	CH_4(%)	NM	NM	NM	**0.3**	**0.0003**	**0.2**	**0.0002**	**0.2**	<0.0002	**0.1**	<0.0002	**0.0**	<0.0002	**0.2**	<0.0002	**0.0**	<0.8	0.0	NM
	TNMO (ppm)	NM	NM	NM	NM	**6**	NM	**7**	NM	**19**	NM	**8**	NM	**11**	NM	**12**	NM	**8**	NM	NM
	O_2(%)	NM	NM	NM	**21.2**	**20.5**	**20.5**	**20.5**	**20.7**	**20.5**	**20.8**	**20.5**	**20.4**	**20.5**	**21.1**	**20.5**	**20.3**	**20.5**	**20.1**	NM
	CO_2(%)	NM	NM	NM	**0.0**	**0.15**	**0.0**	**0.15**	**0.0**	**0.02**	**0.0**	**0.15**	**0.0**	**0.15**	**0.0**	**0.194**	**0.0**	**0.15**	**0.1**	NM
	Benzene (ppb)	NM	NM	NM	NM	<0.8	NM	<0.9	NM	<0.8	NM	<0.9	NM	<0.7	NM	<1.2	NM	<0.8	NM	NM
	Vinyl Chloride (ppb)	NM	NM	NM	NM	<0.8	NM	<0.9	NM	<0.8	NM	<0.9	NM	<0.7	NM	<1.2	NM	<0.8	NM	NM
	Total Organics (ppb)	NM	NM	NM	NM	**8**	NM	**7.3**	NM	(1)	NM	(1)	NM	(1)	NM	(1)	NM	**42.5**	NM	NM
	TCE (ppb)	NM	NM	NM	NM	<0.8	NM	<0.9	NM	<0.8	NM	<0.9	NM	<0.7	NM	<1.2	NM	<0.8	NM	NM
	PCE (ppb)	NM	NM	NM	NM	<0.8	NM	<0.9	NM	<0.8	NM	<0.9	NM	<0.7	NM	<1.2	NM	<0.8	NM	NM
READING ON UNIT	WELL FLOW (CFM)	NM	NM	NA	30	NA	30	NA	30	NA	30	NA	30	NA	30	NA	30	NA	NM	NA
	RA/MA	NM	NM	NA	25/30	NA	25/30	NA	25/30	NA	25/30	NA	25/30	NA	25/30	NA	25/30	NA	NM	NA
	CORRECTED FLOW (CFM)(2)	NM	NM	NA	13.5	NA	13.5	NA	13.5	NA	13.5	NA	13.5	NA	13.5	NA	13.5	NA	NM	NA
	VACUUM (in.)	NM	NM	NA	-30	NA	-30	NA	-30	NA	-30	NA	-30	NA	-30	NA	-30	NA	NM	NA
FIELD PRESSURE MEASUREMENTS (inch)	SVW-1 (EXT. Well)	0.0	NM	NA	NM	NA	NM	NA	NM	NA	NM	NA	NM	NA	NM	NA	NM	NA	NM	NA
	SVP-1 (5')	-0.2	NM	NA	-0.12	NA	-0.06	NA	-0.10	NA	-0.05	NA	-0.09	NA	-0.04	NA	-0.18	NA	NM	NA
	SMP-1 (10')	-0.1	NM	NA	-0.02	NA	-0.06	NA	-0.10	NA	-0.06	NA	-0.09	NA	-0.10	NA	-0.04	NA	NM	NA
	SMP-2 (20')	-0.1	NM	NA	-0.06	NA	-0.04	NA	-0.03	NA	-0.05	NA	-0.07	NA	-0.09	NA	-0.07	NA	NM	NA
	SMP-3 (30')	0.0	NM	NA	-0.07	NA	-0.07	NA	-0.07	NA	-0.10	NA	-0.05	NA	-0.03	NA	-0.02	NA	NM	NA
	AIV-1	0.0	NM	NA	NM	NA	NM	NA	NM	NA	NM	NA	NM	NA	NM	NA	NM	NA	NM	NA
	AIV-2	0.0	NM	NA	NM	NA	NM	NA	NM	NA	NM	NA	NM	NA	NM	NA	NM	NA	NM	NA
	AIV-3	0.0	NM	NA	NM	NA	NM	NA	NM	NA	NM	NA	NM	NA	NM	NA	NM	NA	NM	NA
	AIV-4	0.0	NM	NA	NM	NA	NM	NA	NM	NA	NM	NA	NM	NA	NM	NA	NM	NA	NM	NA

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NM = NOT MEASURED   NA = NOT APPLICABLE   **BOLD NUMBERS** = CONCENTRATIONS ABOVE DETECTION LIMIT OR RECORDED FROM FIELD EQUIPMENT

(1) No constituents were detected above the reporting limit.

(2) Corrected wellhead flow calculated from total flow, adjusted for recycle and makeup air contribution.

TABLE 3.4

SUMMARY OF FIELD AND LABORATORY DATA FOR BROTHERS - SHALLOW ZONE SVE TEST REBOUND PERIOD
WASTE DISPOSAL, INC. SUPERFUND SITE

MONITORING LOCATION	DATE/TIME	7/20/98; 0800		7/27/98; 0830		7/31/98; 0800		8/4/98; 1030		8/18/98; 1400		8/25/98; 0900		9/10/98; 0845		9/25/98; 1010		10/7/98; 0840		10/9/98		11/5/98		12/15/98		1/20/99	
	PARAMETERS	FIELD	LAB	FIELD	LAB	FIELD	LAB	FIELD	LAB	FIELD	LAB	FIELD	LAB	FIELD	LAB	FIELD	LAB	FIELD	LAB	FIELD	LAB	FIELD	LAB	FIELD	LAB	FIELD	LAB
EXTRACTION WELL (SVW-1)	CH_4(%)	**0.1**	**0.0005**	**0.0**	**0.0002**	**0.0**	**0.0002**	**0.0**	**0.0002**	**0.0**	**0.0003**	**0.0**	<0.0002	**0.0**	<0.0002	**0.0**	NS	**0.0**	NS	**0.0**	NS	**0.014**	NS	**0.028**	NS	**0.0**	NS
	TNMO (ppm)	NM	**176**	NM	**163**	NM	**112**	NM	**88**	NM	**46**	NM	**50**	NM	**37**	NM	NS	NM	NS	NM	NS	NM	NS	NM	NS	NM	NS
	O_2(%)	**7.4**	**7.9**	**10.9**	**10.9**	**17**	**16.6**	**16.1**	**15.7**	**8.6**	**9.1**	**7.0**	**7.6**	**7.4**	**7.9**	**6.6**	NS	**8.3**	NS	**7.5**	NS	**2.7**	NS	**2.4**	NS	**2.3**	NS
	CO_2(%)	**5.1**	**5.1**	**2.9**	**2.9**	**2.2**	**2.2**	**1.8**	**2**	**5.4**	**5.3**	**7.4**	**7**	**7.2**	**8**	**7.7**	NS	**7.6**	NS	**7.6**	NS	**9.4**	NS	**9.2**	NS	**9.2**	NS
	Benzene (ppb)	NM	<4.5	NM	<6	NM	**10**	NM	**92**	NM	<13	NM	<1.4	NM	<2.2	NM	NS	NM	NS	NM	NS	NM	NS	NM	NS	NM	NS
	Vinyl Chloride (ppb)	NM	<4.5	NM	<6	NM	<7	NM	<8	NM	<13	NM	<1.4	NM	<2.2	NM	NS	NM	NS	NM	NS	NM	NS	NM	NS	NM	NS
	Total Organics (ppb)	NM	**6,221.5**	NM	**2,563**	NM	**3,705**	NM	**5,076**	NM	**4,306**	NM	**2,440.4**	NM	**489.7**	NM	NS	NM	NS	NM	NS	NM	NS	NM	NS	NM	NS
	TCE (ppb)	NM	<4.5	NM	<6	NM	<7	NM	<8	NM	<13	NM	<1.4	NM	<2.2	NM	NS	NM	NS	NM	NS	NM	NS	NM	NS	NM	NS
	PCE (ppb)	NM	**11.9**	NM	**14**	NM	**13**	NM	**11**	NM	<13	NM	<1.4	NM	**9**	NM	NS	NM	NS	NM	NS	NM	NS	NM	NS	NM	NS

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NS = NO SAMPLE FOR LABORATORY ANALYSES WAS COLLECTED   NM = NOT MEASURED   NA = NOT APPLICABLE   **BOLD NUMBERS** = CONCENTRATIONS ABOVE DETECTION LIMIT OR RECORDED FROM FIELD EQUIPMENT

TABLE 3.5

SUMMARY OF FIELD AND LABORATORY DATA FOR BROTHERS - DEEP WELL SVE TEST
WASTE DISPOSAL, INC. SUPERFUND SITE
(Continued)

MONITORING LOCATION	DATE/TIME	7/26/98; NM		7/27/98; 0830		7/28/98; 0900		7/29/98; 0800		7/30/98, 0800		7/31/98; 0800		8/1/98, 0930		8/3/98; 0830		8/4/98; 1030		8/5/98; 0830		8/6/98; 0830		8/7/98; 0900	
	PARAMETERS	FIELD	LAB	FIELD	LAB	FIELD	LAB	FIELD	LAB	FIELD	LAB	FIELD	LAB	FIELD	LAB	FIELD	LAB	FIELD	LAB	FIELD	LAB	FIELD	LAB	FIELD	LAB
EXTRACTION WELL	CH_4(%)	NM	NM	3.5	3.1	0.2	1.3	2.9	2.6	2.5	2.5	2.3	2.4	2.3	2.2	2.4	2	1.0	0.4	1.8	1.8	1.5	1.6	1.3	1.5
	TNMO (ppm)	NM	NM	NM	447	NM	243	NM	411	NM	430	NM	374	NM	333	NM	307	NM	62	NM	292	NM	261	NM	158
	O_2(%)	NM	NM	0.5	1.4	18.6	9.7	0.4	1	0.8	1	1.8	1	0.2	1	2.1	1.4	2.7	8.4	1.4	1.3	2.5	1.8	3.4	2.4
	CO_2(%)	NM	NM	15.1	13.7	2.3	8	14.5	13.8	14.8	14.1	13.7	14.2	15.2	14.2	13.9	14	7.7	3.5	13.7	13	12.2	12.1	11.8	12
	Benzene (ppb)	NM	NM	NM	204	NM	44	NM	56	NM	49	NM	114	NM	135	NM	125	NM	11.7	NM	50	NM	96	NM	49
	Vinyl Chloride (ppb)	NM	NM	NM	137	NM	35	NM	50	NM	48	NM	117	NM	120	NM	123	NM	9.5	NM	50	NM	86	NM	58
	Total Organics (ppb)	NM	NM	NM	9,377	NM	2,980	NM	4,990	NM	4,038	NM	6,999	NM	10,830	NM	9,932	NM	437.6	NM	2,424	NM	4,866	NM	2,881
	TCE (ppb)	NM	NM	NM	208	NM	97	NM	112	NM	113	NM	213	NM	150	NM	138	NM	22.4	NM	89	NM	107	NM	67
	PCE (ppb)	NM	NM	NM	366	NM	137	NM	161	NM	182	NM	490	NM	442	NM	493	NM	120	NM	323	NM	453	NM	307
POST BLOWER	CH_4(%)	NM	NM	0.7	0.9	0.6	0.8	0.6	0.6	0.6	0.7	0.9	1.1	0.8	1	1.2	0.9	0.7	0.6	0.6	0.8	0.5	0.7	0.5	0.6
	TNMO (ppm)	NM	NM	NM	179	NM	163	NM	51	NM	154	NM	200	NM	166	NM	183	NM	138	NM	155	NM	137	NM	82
	O_2(%)	NM	NM	14.4	14.4	14.9	14.2	13.9	13.2	13.6	13.7	11.1	11.3	11	11.6	12.2	11.6	11.1	11.2	11	11.7	11.3	11.8	11.4	12
	CO_2(%)	NM	NM	4.5	4.1	4.3	4.5	4.8	5.2	5.2	5	7.1	6.8	6.8	6.6	6.6	6.6	5.8	5.3	6.5	6	6.1	5.7	6.0	5.6
	Benzene (ppb)	NM	NM	NM	46	NM	<20	NM	<3.2	NM	23	NM	68	NM	45	NM	73	NM	150	NM	25	NM	38	NM	27
	Vinyl Chloride (ppb)	NM	NM	NM	30	NM	<20	NM	<3.2	NM	22	NM	59	NM	50	NM	65	NM	22	NM	24	NM	34	NM	28
	Total Organics (ppb)	NM	NM	NM	6,031	NM	1,215	NM	747.5	NM	2,539	NM	2,675	NM	1,435	NM	6,359	NM	2,554	NM	1,225	NM	2,322	NM	1,376
	TCE (ppb)	NM	NM	NM	86	NM	34	NM	<3.2	NM	46	NM	94	NM	83	NM	72	NM	43	NM	<7	NM	44	NM	29
	PCE (ppb)	NM	NM	NM	106	NM	42	NM	<3.2	NM	80	NM	229	NM	255	NM	271	NM	186	NM	151	NM	173	NM	132
STACK	CH_4(%)	NM	NM	0.4	0.5	0.7	0.9	0.3	0.8	0.4	0.6	0.5	1	0.5	0.8	0.8	0.7	0.6	0.6	0.4	0.6	0.4	0.5	0.4	0.5
	TNMO (ppm)	NM	NM	NM	37	NM	38	NM	168	NM	45	NM	215	NM	55	NM	60	NM	72	NM	60	NM	53	NM	20
	O_2(%)	NM	NM	13.6	13.4	14.0	13.4	13.8	14	13.5	13.4	11.3	11.3	10.7	11.2	12.3	11.2	11.4	11.2	10.6	11.3	10.8	11.5	11.1	12
	CO_2(%)	NM	NM	5.2	5.1	5.0	5.2	2.9	4.7	5.2	5.2	6.7	6.8	7.1	6.8	6.5	6.8	5.7	5.4	6.7	6.3	6.4	5.9	6.2	5.8
	Benzene (ppb)	NM	NM	NM	<1.5	NM	<1.5	NM	21	NM	<1.4	NM	48	NM	2.3	NM	<1.5	NM	<1.6	NM	<1.4	NM	<0.7	NM	<1.4
	Vinyl Chloride (ppb)	NM	NM	NM	<1.5	NM	<1.5	NM	19	NM	<1.4	NM	47	NM	<1.6	NM	<1.5	NM	<1.6	NM	<1.4	NM	<0.7	NM	<1.4
	Total Organics (ppb)	NM	NM	NM	467.8	NM	328.3	NM	2,219	NM	608	NM	1,384	NM	1,003.1	NM	1,006.4	NM	111.6	NM	734.7	NM	1,013.3	NM	749
	TCE (ppb)	NM	NM	NM	<1.5	NM	<1.5	NM	43	NM	<1.4	NM	96	NM	<1.6	NM	<1.5	NM	<1.6	NM	<1.4	NM	<0.7	NM	<1.4
	PCE (ppb)	NM	NM	NM	<1.5	NM	<1.5	NM	60	NM	<1.4	NM	234	NM	3.3	NM	2.7	NM	4	NM	1.5	NM	4.9	NM	<1.4
READING ON UNIT	WELL FLOW (CFM)	NM	NA	38	NA	38	NA	38	NA	38	NA	44	NA	43	NA	43	NA	43	NA	43	NA	43	NA	43	NA
	RA/MA	NM	NA	20/20	NA	20/15	NA	20/15	NA	20/15	NA	25/15	NA	25/15	NA	25/15	NA	25/15	NA	25/15	NA	25/15	NA	25/15	NA
	CORRECTED FLOW (CFM)(2)	NM	NA	23	NA	25	NA	25	NA	25	NA	26.5	NA	26	NA	26	NA	26	NA	26	NA	26	NA	26	NA
	VACUUM (in.)	NM	NA	-5.5	NA	-6.0	NA	-6.0	NA	-6.0	NA	-8.5	NA	-8.0	NA	-8.0	NA	-8.0	NA	-8.0	NA	-8.0	NA	-8.0	NA
FIELD PRESSURE MEASUREMENT (inch)	DVW-1 (EXT. Well)	NM	NA	-4.4	NA	-5.0	NA	-5.0	NA	-5.0	NA	-8.3	NA	-7.2	NA	-7.2	NA	-8.0	NA	-7.2	NA	-7.2	NA	-7.2	NA
	DVP-1 (5')	NM	NA	-1.7	NA	-1.9	NA	-2.0	NA	-2.0	NA	-3.4	NA	-2.8	NA	-2.9	NA	-3.0	NA	-2.7	NA	-2.7	NA	-2.8	NA
	DMP-1 (10')	NM	NA	-1.4	NA	-1.4	NA	-1.5	NA	-1.6	NA	-2.6	NA	-2.1	NA	-2.2	NA	-2.1	NA	-2.0	NA	-2.0	NA	-2.1	NA
	DMP-2 (20')	NM	NA	-0.85	NA	-0.85	NA	-1.0	NA	-1.3	NA	-2.2	NA	-1.8	NA	-1.8	NA	-1.6	NA	-1.6	NA	-1.5	NA	-1.6	NA
	DMP-3 (30')	NM	NA	-0.6	NA	-0.68	NA	-0.8	NA	-0.88	NA	-1.7	NA	-1.3	NA	-1.3	NA	-1.1	NA	-1.1	NA	-1.0	NA	-1.1	NA
	AIV-1	NM	NA	-0.69	NA	-0.70	NA	-0.8	NA	-0.94	NA	-1.7	NA	-1.4	NA	-1.5	NA	-1.3	NA	-1.2	NA	-1.3	NA	-1.3	NA
	AIV-2	NM	NA	-0.77	NA	-0.78	NA	-0.9	NA	-0.96	NA	-2.0	NA	-1.5	NA	-1.5	NA	-1.4	NA	-1.3	NA	-1.2	NA	-1.3	NA
	AIV-3	NM	NA	-0.72	NA	-0.74	NA	-0.85	NA	-0.88	NA	-2.0	NA	-1.5	NA	-1.6	NA	-1.3	NA	-1.3	NA	-1.3	NA	-1.4	NA
	AIV-4	NM	NA	-1.0	NA	-1.0	NA	-1.2	NA	-1.2	NA	-2.0	NA	-1.5	NA	-1.6	NA	-1.5	NA	-1.4	NA	-1.4	NA	-1.5	NA

NM = NOT MEASURED NA = NOT APPLICABLE BOLD NUMBERS = CONCENTRATIONS ABOVE DETECTION LIMIT OR RECORDED FROM FIELD EQUIPMENT

(1) No constituents were detected above the reporting limit

(2) Corrected wellhead flow calculated from total flow, adjusted for recycle and makeup air contribution.

TABLE 3.5

SUMMARY OF FIELD AND LABORATORY DATA FOR BROTHERS - DEEP ZONE SVE TEST ACTIVE PHASE
WASTE DISPOSAL, INC. SUPERFUND SITE

MONITORING LOCATION	DATE/TIME	(Initial) 7/17/98	7/20/98; 0800		7/20/98; 1000		7/20/98; 1200		7/20/98; 1400		7/20/98; 1600		7/21/98; 0800		7/21/98; 1600		7/22/98, 0830		7/23/98; 0800		7/24/98; 0800		7/25/98; NM	
	PARAMETERS	FIELD	FIELD	LAB	FIELD	LAB	FIELD	LAB	FIELD	LAB	FIELD	LAB	FIELD	LAB	FIELD	LAB	FIELD	LAB	FIELD	LAB	FIELD	LAB	FIELD	LAB
EXTRACTION WELL (DVW-1)	CH_4(%)	3.0	3.1	2.2	4.7	3.8	4.6	3.8	4.6	3.8	4.6	3.8	4.3	3.6	4.3	3.5	4.0	3.4	4.1	3.4	3.4	3.3	NM	NM
	TNMO (ppm)	NM	NM	1,460	NM	591	NM	616	NM	646	NM	644	NM	643	NM	658	NM	561	NM	590	NM	532	NM	NM
	O_2(%)	7.9	8.3	9	0.0	1	0.8	1	12.9	0.9	0.7	0.9	0.9	1	0.9	1.1	1.6	1	1.0	0.9	1.8	1	NM	NM
	CO_2(%)	7.0	7.5	7.4	12.9	13.2	12.9	13.3	0.5	13.4	12.8	13.5	12.7	13.5	12.8	13.5	13.7	13.7	15.1	13.8	13.2	13.8	NM	NM
	Benzene (ppb)	NM	NM	<260	NM	<60	NM	<33	NM	<60	NM	<60	NM	80	NM	100	NM	170	NM	<29	NM	85	NM	NM
	Vinyl Chloride (ppb)	NM	NM	<260	NM	<60	NM	<33	NM	<60	NM	<60	NM	<60	NM	80	NM	136	NM	<29	NM	57	NM	NM
	Total Organics (ppb)	NM	NM	182,610	NM	4,480	NM	6,400	NM	4,740	NM	4,270	NM	4,920	NM	5,010	NM	1,392	NM	3,380	NM	9,349	NM	NM
	TCE (ppb)	NM	NM	<260	NM	<60	NM	<33	NM	<60	NM	<60	NM	<60	NM	<60	NM	189	NM	<29	NM	136	NM	NM
	PCE (ppb)	NM	NM	<260	NM	<60	NM	<33	NM	<60	NM	<60	NM	<60	NM	<60	NM	119	NM	<29	NM	99	NM	NM
POST BLOWER	CH_4(%)	NM	NM	NM	0.5	0.4	0.7	0.6	0.7	0.7	0.7	0.7	0.6	0.9	1.1	0.9	0.6	0.8	0.9	0.684	0.8	0.9	NM	NM
	TNMO (ppm)	NM	NM	NM	NM	92	NM	136	NM	143	NM	147	NM	203	NM	209	NM	167	NM	130	NM	182	NM	NM
	O_2(%)	NM	NM	NM	18.0	18.2	16.7	16.9	16.5	16.8	16.6	16.6	17.9	15.1	14.6	15	16.5	15.7	14.0	17.1	14.4	14.7	NM	NM
	CO_2(%)	NM	NM	NM	1.5	1.6	2.4	2.5	2.5	2.6	2.5	2.7	2.2	3.8	3.7	3.9	2.9	3.4	4.4	2.5	4.3	4.2	NM	NM
	Benzene (ppb)	NM	NM	NM	NM	<3	NM	6	NM	3.8	NM	9	NM	36	NM	29	NM	52	NM	24.6	NM	30	NM	NM
	Vinyl Chloride (ppb)	NM	NM	NM	NM	<3	NM	15	NM	14.8	NM	14	NM	30	NM	25	NM	34	NM	14.1	NM	19	NM	NM
	Total Organics (ppb)	NM	NM	NM	NM	29.9	NM	141	NM	62.2	NM	73	NM	206	NM	133	NM	306	NM	162.2	NM	3,325	NM	NM
	TCE (ppb)	NM	NM	NM	NM	<3	NM	14	NM	<3 6	NM	<6	NM	<7	NM	<7	NM	<6	NM	31.1	NM	44	NM	NM
	PCE (ppb)	NM	NM	NM	NM	<3	NM	<6	NM	<3.6	NM	<6	NM	8	NM	<7	NM	31	NM	20.3	NM	37	NM	NM
STACK	CH_4(%)	NM	NM	NM	0.4	0.3	0.5	0.5	0.6	0.5	0.6	0.5	0.5	0.5	0.5	0.5	0.4	0.5	0.9	0.52	0.5	0.6	NM	NM
	TNMO (ppm)	NM	NM	NM	NM	19	NM	22	NM	28	NM	26	NM	36	NM	34	NM	33	NM	30	NM	40	NM	NM
	O_2(%)	NM	NM	NM	17.8	18	16.3	16.6	16.2	16.5	16.2	16.4	16.2	14.4	13.7	14.3	16.4	15	14.0	16.8	14.2	14.1	NM	NM
	CO_2(%)	NM	NM	NM	1.6	1.7	2.6	2.7	2.7	2.8	2.7	2.9	2.7	4.2	4.2	4.3	2.9	3.9	4.4	2.7	4.4	4.6	NM	NM
	Benzene (ppb)	NM	NM	NM	NM	<1.4	NM	<0.7	NM	<0.7	NM	<0.8	NM	<0.7	NM	<0.8	NM	<6	NM	<3.6	NM	<2.9	NM	NM
	Vinyl Chloride (ppb)	NM	NM	NM	NM	1.9	NM	<0.7	NM	<0.7	NM	<0.8	NM	<0.7	NM	<0.8	NM	<6	NM	<3.6	NM	<2.9	NM	NM
	Total Organics (ppb)	NM	NM	NM	NM	154.8	NM	183.3	NM	164.9	NM	129	NM	373	NM	274	NM	429	NM	378	NM	764	NM	NM
	TCE (ppb)	NM	NM	NM	NM	<1.4	NM	<0.7	NM	<0 7	NM	<0.8	NM	<0.7	NM	<0.8	NM	<6	NM	<3.6	NM	<2.9	NM	NM
	PCE (ppb)	NM	NM	NM	NM	6.5	NM	<0.7	NM	<0.7	NM	<0.8	NM	<0.7	NM	<0.8	NM	<6	NM	<3.6	NM	<2.9	NM	NM
READING ON UNIT	WELL FLOW (CFM)	NM	NM	NA	40	NA	35	NA	35	NA	35	NA	35	NA	35	NA	35	NA	35	NA	37	NA	NM	NA
	RA/MA	NM	35/40	NA	35/30	NA	35/30	NA	35/30	NA	35/30	NA	35/30	NA	40/35	NA	40/35	NA	40/35	NA	35/30	NA	NM	NA
	CORRECTED FLOW (CFM)(2)	NM	NM	NA	14	NA	13.8	NA	13.8	NA	13 8	NA	13.8	NA	9.0	NA	9.0	NA	9.0	NA	14.2	NA	NM	NA
	VACUUM (in.)	NM	NM	NA	-2.0	NA	-2.0	NA	-2.0	NA	-2.0	NA	-2.0	NA	-4.0	NA	-4.0	NA	-2.5	NA	-5.0	NA	NM	NA
FIELD PRESSURE MEASUREMENTS (inch)	DVW-1 (EXT. Well)	0.0	NM	NA	NM	NA	-2.5	NA	-2.5	NA	-2.5	NA	-3.5	NA	-3.5	NA	-3 4	NA	-2.6	NA	-4.4	NA	NM	NA
	DVP-1 (10')	0.0	NM	NA	-0.74	NA	-0.78	NA	-0.74	NA	-0.70	NA	-1.4	NA	-1.2	NA	-1.4	NA	-1.2	NA	-1.8	NA	NM	NA
	DMP-1 (20')	0.0	NM	NA	-0.42	NA	-0.59	NA	-0.46	NA	-0.50	NA	-0.9	NA	-0.65	NA	-0.93	NA	-0.78	NA	-1.4	NA	NM	NA
	DMP-2 (40')	0.0	NM	NA	-0.44	NA	-0.44	NA	-0.34	NA	-0.38	NA	-0.7	NA	-0.42	NA	-0.76	NA	-0.63	NA	-1.2	NA	NM	NA
	DMP-3 (60')	0.0	NM	NA	-0.27	NA	-0.34	NA	-0.18	NA	-0.14	NA	-0.53	NA	-0.21	NA	-0.54	NA	-0.50	NA	-0.9	NA	NM	NA
	AIV-1	0.0	NM	NA	-0.44	NA	-0.40	NA	-0.28	NA	-0.28	NA	-0.60	NA	-0.38	NA	-0.63	NA	-0.59	NA	-1.0	NA	NM	NA
	AIV-2	0.0	NM	NA	-0.46	NA	-0.41	NA	-0.20	NA	-0.31	NA	-0.60	NA	-0.34	NA	-0.66	NA	-0.52	NA	-1.0	NA	NM	NA
	AIV-3	0.0	NM	NA	-0.44	NA	-0.41	NA	-0.21	NA	-0.23	NA	-0.60	NA	-0.30	NA	-0.60	NA	-0.57	NA	-1.0	NA	NM	NA
	AIV-4	0.0	NM	NA	-0.52	NA	-0.43	NA	-0.28	NA	-0.36	NA	-0.68	NA	-0.42	NA	-0.74	NA	-0.62	NA	-1.1	NA	NM	NA

NM = NOT MEASURED NA = NOT APPLICABLE BOLD NUMBERS = CONCENTRATIONS ABOVE DETECTION LIMIT OR RECORDED FROM FIELD EQUIPMENT

(1) No constituents were detected above the reporting limit

(2) Corrected wellhead flow calculated from total flow, adjusted for recycle and makeup air contribution.

TABLE 3.6

SUMMARY OF FIELD AND LABORATORY DATA FOR BROTHERS - DEEP ZONE SVE TEST REBOUND PERIOD
WASTE DISPOSAL, INC. SUPERFUND SITE

MONITORING LOCATION	DATE/TIME	8/7/98, 1000		8/10/98, 1300		8/14/98, 0855		8/18/98, 1400		8/21/98, 1155		8/25/98, 0905	
	PARAMETERS	FIELD	LAB	FIELD	LAB	FIELD	LAB	FIELD	LAB	FIELD	LAB	FIELD	LAB
EXTRACTION WELL (DVW 1)	CH_4(%)	**1.5**	**1.6**	**1.4**	**1.2**	**1.3**	**1**	**1.1**	**0.00008**	**1.2**	**0.00009**	**1.1**	**0.00009**
	TNMO (ppm)	NM	**158**	NM	**682**	NM	**854**	NM	**643**	NM	**702**	NM	**753**
	O_2(%)	**2.5**	**2.4**	**1.5**	**2**	**3.8**	**3.8**	**6.0**	**6.6**	**5.4**	**6**	**4.4**	**6.6**
	CO_2(%)	**12.2**	**5.8**	**12.1**	**11.4**	**10.1**	**10**	**8.7**	**8.3**	**9 1**	**8.7**	**9.0**	**8.3**
	Benzene (ppb)	NM	**62**	NM	<120	NM	**77**	NM	**62**	NM	**34**	NM	**43**
	Vinyl Chloride (ppb)	NM	**64**	NM	<120	NM	**37**	NM	**31**	NM	<30	NM	<27
	Total Organics (ppb)	NM	**2,907**	NM	**32,930**	NM	**28,835**	NM	**127,352**	NM	**85,785**	NM	**75,698**
	TCE (ppb)	NM	**60**	NM	<120	NM	**43**	NM	**72**	NM	**39**	NM	**30**
	PCE (ppb)	NM	**254**	NM	**130**	NM	**105**	NM	**254**	NM	**140**	NM	**100**

MONITORING LOCATION	DATE/TIME	9/10/98, 0845		9/25/98, 1010		10/7/98, 0840		10/9/98		11/5/98		11/20/98		12/17/98		1/20/99	
	PARAMETERS	FIELD	LAB	FIELD	LAB	FIELD	LAB	FIELD	LAB	FIELD	LAB	FIELD	LAB	FIELD	LAB	FIELD	LAB
EXTRACTION WELL (DVW 1)	CH_4(%)	**1.1**	**1**	**0.6**	NS	**0.7**	NS	**1.3**	NS	**2.3**	NS	**1.9**	NS	**1.8**	NS	**1.6**	NS
	TNMO (ppm)	NM	**706**	NM	NS	NM	NS	NM	NS	NM	NS	NM	NS	NM	NS	NM	NS
	O_2(%)	**6.0**	**7 2**	**7.4**	NS	**3.2**	NS	**0.0**	NS	**0.0**	NS	**0.0**	NS	**0.0**	NS	**0.0**	NS
	CO_2(%)	**8 4**	**7 8**	**7 1**	NS	**9.6**	NS	**12.7**	NS	**14 1**	NS	**1 5**	NS	**15.7**	NS	**14.7**	NS
	Benzene (ppb)	NM	**33**	NM	NS	NM	NS	NM	NS	NM	NS	NM	NS	NM	NS	NM	NS
	Vinyl Chloride (ppb)	NM	**18**	NM	NS	NM	NS	NM	NS	NM	NS	NM	NS	NM	NS	NM	NS
	Total Organics (ppb)	NM	**648,403**	NM	NS	NM	NS	NM	NS	NM	NS	NM	NS	NM	NS	NM	NS
	TCE (ppb)	NM	**49**	NM	NS	NM	NS	NM	NS	NM	NS	NM	NS	NM	NS	NM	NS
	PCE (ppb)	NM	**160**	NM	NS	NM	NS	NM	NS	NM	NS	NM	NS	NM	NS	NM	NS

94 256/TM#9A Rev 3 (3/1/99/mm)

NS = NO SAMPLE FOR LABORATORY ANALYSES WAS COLLECTED   NM = NOT MEASURED   NA = NOT APPLICABLE   **BOLD NUMBERS** = CONCENTRATIONS ABOVE DETECTION LIMIT OR RECORDED FROM FIELD EQUIPMENT

TABLE 3.8

SUMMARY OF FIELD AND LABORATORY DATA FOR C&E DIE - SHALLOW ZONE SVE TEST ACTIVE PHASE
WASTE DISPOSAL, INC. SUPERFUND SITE

MONITORING LOCATION	DATE/TIME	(Initial) 7/21/98; 1230	7/22/98, 0930		7/22/98; 1130		7/22/98; 1330		7/22/98: 1530		7/22/98; 1730		7/23/98; 1900		7/23/98; 1600		7/24/98; 0900	
		FIELD	FIELD	LAB	FIELD	LAB	FIELD	LAB	FIELD	LAB	FIELD	LAB	FIELD	LAB	FIELD	LAB	FIELD	LAB
EXTRACTION WELL (SVW-1)	CH_4(%)	**0.2**	**0.2**	**0.029**	**0.1**	**0.2**	**0.1**	**0.3**	**0.0**	**0.3**	**0.0**	**0.3**	**0.0**	**0.2**	**0.0**	**0.2**	**0.0**	**0.05**
	TNMO (ppm)	NM	NM	**3,000**	NM	**150**	NM	**120**	NM	**110**	NM	**110**	NM	**60**	NM	**63**	NM	**36**
	O_2(%)	**12.6**	**13.2**	**13.3**	**17.2**	**17**	**17.3**	**17**	**17.6**	**17**	**17.8**	**18**	**17.9**	**20**	**19.2**	**20**	**20.2**	**20.9**
	CO_2(%)	**5.7**	**5.9**	**5.78**	**3.3**	**3.9**	**2.9**	**3.1**	**2.6**	**3**	**2.5**	**2.9**	**2.2**	**1.3**	**1.0**	**1.1**	**0.4**	**0.46**
	Benzene (ppb)	NM	NM	**110**	NM	**22**	NM	**28**	NM	**26**	NM	**25**	NM	**11**	NM	**10**	NM	**3.3**
	Vinyl Chloride (ppb)	NM	NM	**140**	NM	**6.1**	NM	**7.2**	NM	**6.5**	NM	**7.7**	NM	**3.5**	NM	**3.5**	NM	**1.1**
	Total Organics (ppb)	NM	NM	**4,812**	NM	**126**	NM	**179**	NM	**146**	NM	**99**	NM	**62**	NM	**50**	NM	**44**
	TCE (ppb)	NM	NM	<38	NM	<3 8	NM	<1.9	NM	**1.3**	NM	**1.2**	NM	**1**	NM	**1**	NM	**0.47**
	PCE (ppb)	NM	NM	<30	NM	<2 6	NM	**1.4**	NM	**1.8**	NM	**2**	NM	**2.5**	NM	**2.7**	NM	**1.5**
POST BLOWER	CH_4(%)	NM	NM	NM	**0.0**	**0.032**	**0.1**	**0.04**	**0.0**	**0.1**	**0.0**	**0.1**	**0.0**	**0.042**	**0.0**	**0.1**	**0.0**	**0.03**
	TNMO (ppm)	NM	NM	NM	NM	**47**	NM	**34**	NM	**27**	NM	**26**	NM	**39**	NM	**43**	NM	**24**
	O_2(%)	NM	NM	NM	**20.1**	**20**	**20.2**	**20**	**20.1**	**20**	**20.0**	**20**	**20.6**	**21**	**19.7**	**20**	**20.4**	**20.3**
	CO_2(%)	NM	NM	NM	**0.6**	**0.7**	**0.5**	**0.6**	**0.5**	**0.6**	**0.5**	**0.6**	**0.6**	**0.4**	**0.4**	**0.5**	**0.2**	**0.3**
	Benzene (ppb)	NM	NM	NM	NM	**4.9**	NM	**5.7**	NM	**5.6**	NM	**5.6**	NM	**3.4**	NM	**5**	NM	**2.3**
	Vinyl Chloride (ppb)	NM	NM	NM	NM	**1.4**	NM	**1.5**	NM	**1.3**	NM	**1.4**	NM	<1 6	NM	**1.6**	NM	<1.6
	Total Organics (ppb)	NM	NM	NM	NM	**218**	NM	**193**	NM	**127**	NM	**97**	NM	**38**	NM	**50**	NM	**28.4**
	TCE (ppb)	NM	NM	NM	NM	<0 75	NM	<0.75	NM	<0.75	NM	<0 75	NM	<0.75	NM	**0.5**	NM	<0.75
	PCE (ppb)	NM	NM	NM	NM	**0.5**	NM	**0.4**	NM	**0.5**	NM	**0.5**	NM	**0.1**	NM	**1.4**	NM	**1.1**
STACK	CH_4(%)	NM	NM	NM	**0.0**	**0.031**	**0.1**	**0.035**	**0.0**	**0.05**	**0.0**	**0.1**	**0.0**	**0.042**	**0.0**	**0.1**	**0.0**	**0.03**
	TNMO (ppm)	NM	NM	NM	NM	**35**	NM	**28**	NM	**21**	NM	**25**	NM	**18**	NM	**28**	NM	**19**
	O_2(%)	NM	NM	NM	**20.3**	**20**	**20.2**	**20**	**20.1**	**20**	**20.2**	**20**	**20.6**	**20**	**19.5**	**20**	**20.4**	**20.5**
	CO_2(%)	NM	NM	NM	**0.6**	**0.7**	**0.5**	**0.7**	**0.5**	**0.6**	**0.5**	**0.6**	**0.6**	**0.4**	**0.5**	**0.5**	**0.2**	**0.29**
	Benzene (ppb)	NM	NM	NM	NM	**1.7**	NM	<1.3	NM	0.92	NM	**1.6**	NM	<1.3	NM	<1.3	NM	<1.3
	Vinyl Chloride (ppb)	NM	NM	NM	NM	**32**	NM	<1.6	NM	<1 6	NM	<1.6	NM	<1.6	NM	<1.6	NM	<1.6
	Total Organics (ppb)	NM	NM	NM	NM	**120**	NM	**36**	NM	**48**	NM	**15**	NM	**7.9**	NM	**10**	NM	**2.1**
	TCE (ppb)	NM	NM	NM	NM	<0.75	NM	<0.75	NM	<0.75	NM	<0.75	NM	<0.75	NM	<0.75	NM	<0.75
	PCE (ppb)	NM	NM	NM	NM	<0.60	NM	<0.60	NM	<0.60	NM	<0.60	NM	<0.60	NM	<0 60	NM	<0.60
READING ON UNIT	WELL FLOW (CFM)	NM	NM	NA	NM	NA	48	NA	NM	NA	45	NA	NM	NA	54	NA	38	NA
	RA/MA	NM	NM	NA	20/30	NA	20/30	NA	20/30	NA	20/30	NA	20/30	NA	10/30	NA	10/30	NA
	CORRECTED FLOW (CFM)(2)	NM	NM	NA		NA	24	NA	--	NA	22.5	NA	--	NA	33	NA	23	NA
	VACUUM (in.)	NM	NM	NA	-8.0	NA	-8 0	NA	-8 0	NA	-8 0	NA	-8 0	NA	-10	NA	-8	NA
FIELD PRESSURE MEASUREMENTS (inch)	SVW-1 (EXT. Well)	0.0	NM	NA	-8.6	NA	-8.6	NA	-8.6	NA	-8.5	NA	-8.0	NA	-8.0	NA	-8.4	NA
	SVP-1 (5')	0.0	NM	NA	-0.15	NA	-0.15	NA	-0.15	NA	-0.14	NA	-0.08	NA	-0.08	NA	-0.1	NA
	SMP-1 (10')	0 0	NM	NA	-0.04	NA	-0.01	NA	-0.01	NA	-0.01	NA	-0 02	NA	-0.02	NA	-0.02	NA
	SMP-2 (20')	0.0	NM	NA	-0.01	NA	-0 04	NA	-0.01	NA	-0.02	NA	-0.08	NA	-0.08	NA	-0.04	NA
	SMP-3 (30')	0.0	NM	NA	-0 13	NA	-0.10	NA	-0.08	NA	-0 10	NA	-0.13	NA	-0.13	NA	-0.13	NA
	AIV-1	0.0	NM	NA	NM	NA	NM	NA	NM	NA	NM	NA	NM	NA	NM	NA	NM	NA
	AIV-2	0.0	NM	NA	NM	NA	NM	NA	NM	NA	NM	NA	NM	NA	NM	NA	NM	NA
	AIV-3	0.0	NM	NA	NM	NA	NM	NA	NM	NA	NM	NA	NM	NA	NM	NA	NM	NA
	AIV-4	0.0	NM	NA	NM	NA	NM	NA	NM	NA	NM	NA	NM	NA	NM	NA	NM	NA

94-256/TM#9A Rev 3 (2/26/99/mm)

NM = NOT MEASURED   NA = NOT APPLICABLE   **BOLD NUMBERS** = CONCENTRATIONS ABOVE DETECTION LIMIT OR RECORDED FROM FIELD EQUIPMENT

(1) No constituents were detected above the reporting limit.

(2) Corrected wellhead flow calculated from total flow, adjusted for recycle and makeup air contribution.

TABLE 3.9

SUMMARY OF FIELD AND LABORATORY DATA FOR C&E DIE - DEEP ZONE SVE TEST ACTIVE PHASE
WASTE DISPOSAL, INC. SUPERFUND SITE

MONITORING LOCATION	DATE/TIME	(Initial) 7/27/98; 1230	7/28/98; 0800		7/28/98; 1000		7/28/98; 1200		7/28/98; 1400		7/28/98; 1600		7/29/98; 0830		7/29/98; 1530		7/30/98; 0900		8/1/98, 0900		8/3/98; 0930		8/4/98; 1330		8/5/98; 1000		8/6/98; 1000		8/7/98; 0730	
	PARAMETERS	FIELD	FIELD	LAB	FIELD	LAB	FIELD	LAB	FIELD	LAB	FIELD	LAB	FIELD	LAB	FIELD	LAB	FIELD	LAB	FIELD	LAB	FIELD	LAB	FIELD	LAB	FIELD	LAB	FIELD	LAB	FIELD	LAB
EXTRACTION WELL (DVW-1)	CH_4(%)	**2.7**	**2.7**	**1.6**	**4.0**	**3.38**	**3.1**	**3.2**	**3.1**	**2.93**	**2.6**	**2.72**	**1.9**	**1.97**	**1.6**	**1.53**	**1.3**	**1.44**	**1.1**	**1.17**	**1.2**	**1.08**	**1.0**	**0.967**	**0.9**	**0.915**	**0.6**	**0.851**	**0.5**	**1**
	TNMO (ppm)	NM	NM	**5,800**	NM	**2,000**	NM	**1,800**	NM	**1,700**	NM	**1,700**	NM	**1,100**	NM	**840**	NM	**1,400**	NM	**2,700**	NM	**2,600**	NM	**2,800**	NM	**2,700**	NM	**2,600**	NM	**1,600**
	O_2(%)	**13.3**	**13.5**	**13.5**	**0.7**	**1.73**	**1.2**	**1.1**	**1.2**	**1.44**	**1.7**	**1.17**	**1.3**	**1.18**	**2.1**	**3.65**	**1.4**	**1.16**	**2.5**	**2.08**	**3.6**	**3.15**	**3.2**	**2.56**	**3.9**	**3.61**	**5.7**	**4.77**	**6.3**	**4.77**
	CO_2(%)	**4.5**	**4.4**	**4.1**	**18.9**	**16.8**	**19.0**	**18.1**	**19.0**	**18.2**	**18.7**	**18**	**17.5**	**17.8**	**17.0**	**15.2**	**17.3**	**17.1**	**15.7**	**16.6**	**15.7**	**16.6**	**16.3**	**15.4**	**15.6**	**15.1**	**14.0**	**14.4**	**13.7**	**14.1**
	Benzene (ppb)	NM	NM	<130	NM	**61**	NM	**60**	NM	**51**	NM	**43**	NM	**19**	NM	**17**	NM	**14**	NM	**25**	NM	**54**	NM	**150**	NM	**160**	NM	**180**	NM	**160**
	Vinyl Chloride (ppb)	NM	NM	<160	NM	<39	NM	**52**	NM	**58**	NM	**57**	NM	**85**	NM	**90**	NM	**67**	NM	**39**	NM	**38**	NM	**92**	NM	**80**	NM	**72**	NM	**82**
	Total Organics (ppb)	NM	NM	233,578	NM	**852**	NM	**351**	NM	**424**	NM	**131**	NM	**142**	NM	**181.4**	NM	**159**	NM	**220**	NM	**397**	NM	**1822**	NM	**1,564**	NM	**1,677**	NM	**1,205**
	TCE (ppb)	NM	NM	<74	NM	<19	NM	<19	NM	<19	NM	<7.4	NM	<9.3	NM	<7.4	NM	<9.3	NM	<19	NM	<19	NM	<9.3	NM	<9.3	NM	<9.3	NM	<38
	PCE (ppb)	NM	NM	<59	NM	<15	NM	<15	NM	<15	NM	<5.9	NM	<7.4	NM	<5.9	NM	**9.4**	NM	**48**	NM	**90**	NM	**230**	NM	**290**	NM	**290**	NM	**170**
POST BLOWER	CH_4(%)	NM	NM	NM	**4.2**	**3.27**	**3.3**	**3.2**	**3.3**	**2.95**	**2.2**	**2.68**	**2.0**	**1.97**	**0.8**	**1.78**	**0.9**	**1.1**	**0.8**	**0.879**	**1.0**	**0.81**	**0.7**	**0.724**	**0.6**	**0.695**	**0.6**	**0.62**	**0.5**	**0.78**
	TNMO (ppm)	NM	NM	NM	NM	**1,900**	NM	**1,900**	NM	**1,800**	NM	**880**	NM	**1,100**	NM	**1,100**	NM	**1,000**	NM	**2,000**	NM	**2,100**	NM	**2,100**	NM	**2,200**	NM	**1,900**	NM	**1,300**
	O_2(%)	NM	NM	NM	**0.0**	**1.15**	**0.1**	**1.52**	**0.1**	**1.28**	**0.1**	**1.08**	**1.5**	**2.15**	**0.5**	**1.44**	**4.5**	**5.25**	**4.8**	**6.04**	**6.9**	**7.06**	**6.8**	**7.01**	**6.7**	**7.34**	**7.8**	**8.29**	**7.9**	**9.22**
	CO_2(%)	NM	NM	NM	**19.5**	**16.2**	**20.4**	**18.2**	**20.4**	**18.5**	**20.4**	**17.8**	**17.8**	**17.3**	**19.1**	**17.7**	**14.0**	**13.2**	**13.8**	**12.7**	**12.8**	**12.8**	**13.1**	**12**	**13.1**	**11.9**	**12.0**	**11**	**11.9**	**10.9**
	Benzene (ppb)	NM	NM	NM	NM	**59**	NM	**59**	NM	**50**	NM	**43**	NM	**19**	NM	**15**	NM	**12**	NM	**20**	NM	**31**	NM	**99**	NM	**130**	NM	**130**	NM	**110**
	Vinyl Chloride (ppb)	NM	NM	NM	NM	**40**	NM	**51**	NM	**59**	NM	**59**	NM	**87**	NM	**86**	NM	**59**	NM	**32**	NM	**33**	NM	**65**	NM	**60**	NM	**64**	NM	**45**
	Total Organics (ppb)	NM	NM	NM	NM	**910**	NM	**365**	NM	**426**	NM	**119**	NM	**149**	NM	**146**	NM	**139.6**	NM	**183**	NM	**223**	NM	**1,005**	NM	**1.156**	NM	**1,238**	NM	**886**
	TCE (ppb)	NM	NM	NM	NM	<19	NM	<19	NM	<19	NM	<19	NM	<9.3	NM	<9.3	NM	<9.3	NM	<19	NM	<19	NM	<9.3	NM	<9.3	NM	<9.3	NM	<19
	PCE (ppb)	NM	NM	NM	NM	<15	NM	<15	NM	<15	NM	<15	NM	<7.4	NM	<7.4	NM	**8.5**	NM	**42**	NM	**57**	NM	**180**	NM	**220**	NM	**200**	NM	**120**
STACK	CH_4(%)	NM	NM	NM	**3.6**	**3.43**	**3.1**	**3.13**	**3.1**	**2.91**	**2.1**	**2.73**	**1.1**	**1.91**	**0.9**	**1.78**	**0.9**	**1.07**	**0.8**	**0.864**	**0.6**	**0.79**	**0.8**	**0.743**	**0.6**	**0.684**	**0.5**	**0.635**	**0.5**	**0.77**
	TNMO (ppm)	NM	NM	NM	NM	**220**	NM	**260**	NM	**360**	NM	**230**	NM	**280**	NM	**400**	NM	**980**	NM	**1,900**	NM	**2,000**	NM	**2,000**	NM	**2,000**	NM	**1,900**	NM	**1,200**
	O_2(%)	NM	NM	NM	**0.2**	**1.14**	**0.0**	**1.26**	**0.0**	**1.24**	**0.0**	**1.08**	**0.3**	**0.97**	**0.5**	**1.38**	**4.7**	**6.04**	**4.8**	**6.56**	**6.7**	**7.73**	**6.7**	**7.19**	**6.7**	**7.42**	**7.8**	**8.29**	**7.9**	**9.6**
	CO_2(%)	NM	NM	NM	**19.4**	**17.2**	**20.5**	**18**	**20.5**	**18.3**	**20.7**	**18.3**	**19.6**	**18**	**19.3**	**17.6**	**13.9**	**13**	**13.8**	**12.8**	**13.0**	**12.5**	**13.1**	**12.2**	**13.3**	**11.6**	**12.0**	**10.9**	**12.0**	**10.9**
	Benzene (ppb)	NM	NM	NM	NM	**110**	NM	**3.6**	NM	**8.7**	NM	**3.4**	NM	<3.1	NM	<3.1	NM	<16	NM	**32**	NM	**40**	NM	**70**	NM	**97**	NM	**72**	NM	**110**
	Vinyl Chloride (ppb)	NM	NM	NM	NM	<3.9	NM	<3.9	NM	<7.8	NM	<3.9	NM	<3.9	NM	<3.9	NM	<20	NM	<39	NM	<39	NM	**20**	NM	<20	NM	<20	NM	**39**
	Total Organics (ppb)	NM	NM	NM	NM	**144**	NM	**52.9**	NM	**45.4**	NM	**60.1**	NM	**131**	NM	**91.6**	NM	**46.2**	NM	**122**	NM	**137**	NM	**455**	NM	**645**	NM	**475**	NM	**687**
	TCE (ppb)	NM	NM	NM	NM	<1.9	NM	<1.9	NM	<3.7	NM	<1.9	NM	<1.9	NM	<1.9	NM	<9.3	NM	<19	NM	<19	NM	<9.3	NM	<9.3	NM	<9.3	NM	<38
	PCE (ppb)	NM	NM	NM	NM	<1.5	NM	<1.5	NM	<3.0	NM	<1.5	NM	<1.5	NM	<1.5	NM	**7.2**	NM	**38**	NM	**67**	NM	**190**	NM	**220**	NM	**180**	NM	**120**
READING ON UNIT	WELL FLOW (CFM)	NM	NM	NA	30	NA	60	NA	NM	NA	NM	NA	55	NA	56	NA	61	NA	62	NA	61	NA	76	NA	72	NA	67	NA	57	NA
	RA/MA	NM	NM	NA	20/0	NA	30/0	NA	30/0	NA	30/0	NA	30/0	NA	30/0	NA	30/0	NA	30/0	NA	30/0	NA	30/0	NA	30/0	NA	30/0	NA	30/0	NA
	CORRECTED FLOW (CFM)[2]	NM	NM	NA	24	NA	42	NA	--	NA	--	NA	39	NA	40	NA	42	NA	43	NA	42	NA	53	NA	51	NA	47	NA	40	NA
	VACUUM (in.)	NM	NM	NA	-10	NA	-22	NA	-22	NA	-22	NA	-23	NA	-23	NA	-23	NA	-23	NA	-23	NA	-23	NA	-23	NA	-23	NA	-23	NA
FIELD PRESSURE MEASUREMENTS (inch)	DVW-1 (EXT. Well)	0.0	NM	NA	-9.4	NA	NM	NA	-17	NA	-19	NA	-20	NA	-21	NA	-20.5	NA	-20.5	NA	-20.0	NA	-20.0	NA	-20.0	NA	-20.0	NA	-20.0	NA
	DVP-1 (10')	0.0	NM	NA	-4.4	NA	-8.8	NA	-8.6	NA	-9.0	NA	-9.4	NA	-9.5	NA	-9.0	NA	-9.0	NA	-9.6	NA	-9.5	NA	-9.6	NA	-9.4	NA	-9.4	NA
	DMP-1 (20')	0.0	NM	NA	-3.8	NA	-7.6	NA	-7.5	NA	-7.6	NA	-8.2	NA	-8.3	NA	-8.0	NA	-8.0	NA	-8.4	NA	-8.3	NA	-8.4	NA	-8.1	NA	-8.2	NA
	DMP-2 (40')	-0.1	NM	NA	-2.6	NA	-5.4	NA	-5.4	NA	-5.4	NA	-5.6	NA	-5.5	NA	-5.5	NA	-5.5	NA	-6.0	NA	-5.8	NA	-6.0	NA	-5.7	NA	-5.8	NA
	DMP-3 (60')	0.0	NM	NA	-2.4	NA	-4.7	NA	-4.6	NA	-4.7	NA	-5.0	NA	-5.1	NA	-5.0	NA	-5.0	NA	-5.2	NA	-5.0	NA	-5.3	NA	-5.0	NA	-5.1	NA
	AIV-1	0.0	NM	NA	-2.8	NA	-5.6	NA	-5.4	NA	-5.5	NA	-5.8	NA	-6.0	NA	-6.0	NA	-6.0	NA	-6.2	NA	-6.0	NA	-6.2	NA	-6.0	NA	-6.0	NA
	AIV-2	0.0	NM	NA	-2.8	NA	-5.7	NA	-5.6	NA	-5.6	NA	-5.8	NA	-6.0	NA	-6.0	NA	-6.0	NA	-6.2	NA	-6.0	NA	-6.2	NA	-5.8	NA	-6.0	NA
	AIV-3	0.0	NM	NA	-2.8	NA	-5.6	NA	-5.3	NA	-5.4	NA	-5.8	NA	-5.8	NA	-5.5	NA	-5.5	NA	-6.1	NA	-6.0	NA	-6.2	NA	-5.8	NA	-5.9	NA
	AIV-4	0.0	NM	NA	-2.6	NA	-4.9	NA	-4.85	NA	-4.9	NA	-5.4	NA	-5.5	NA	-5.0	NA	-5.0	NA	-5.6	NA	-5.4	NA	-5.6	NA	-5.2	NA	-5.4	NA

NM = NOT MEASURED NA = NOT APPLICABLE **BOLD NUMBERS** = CONCENTRATIONS ABOVE DETECTION LIMIT OR RECORDED FROM FIELD EQUIPMENT

(1) No constituents were detected above the reporting limit.

(2) Corrected wellhead flow calculated from total flow, adjusted for recycle and makeup air contribution.

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TABLE 3.7

C&E DIE
SVE START-UP AND OPERATIONAL PARAMETERS
WASTE DISPOSAL, INC. SUPERFUND SITE

PARAMETERS	SHALLOW WELL					DEEP WELL					AIR INJECTION VENTS (AIV)			
	SVW-1	SVP-1	SMP-1	SMP-2	SMP-3	DVW-1	DVP-1	DMP-1	DMP-2	DMP-3	AIV-1	AIV-2	AIV-3	AIV-4
	7/22/98; 0930	7/22/98; 0930	7/22/98; 0930	7/22/98; 0930	7/22/98; 0930	7/28/98; 0800	7/28/98; 0800	7/28/98; 0800	7/28/98; 0800	7/28/98; 0800	7/28/98; 0800	7/28/98; 0800	7/28/98; 0800	7/28/98; 0800
Wellhead Vacuum (Inches)	-8	-0.15	-0.04	-0.01	-013	-10	-4.4	-3.8	-2.6	-2.4	-2.8	-2.8	-2.8	-2.6
Well Flow (Fpm)	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Recycle Air (%)	20	--	--	--	--	20	--	--	--	--	--	--	--	--
Make Up Air (%)	30	--	--	--	--	0	--	--	--	--	--	--	--	--
Catalyst Temperatures (°C)														
• Inlet	692	--	--	--	--	647	--	--	--	--	--	--	--	--
• Center 1	777	--	--	--	--	750	--	--	--	--	--	--	--	--
• Center 2	--	--	--	--	--	--	--	--	--	--	--	--	--	--
• Outlet	742	--	--	--	--	658	--	--	--	--	--	--	--	--

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TABLE 3.10

SUMMARY OF FIELD AND LABORATORY DATA FOR C&E DIE - SHALLOW ZONE SVE TEST REBOUND PERIOD
WASTE DISPOSAL, INC. SUPERFUND SITE

MONITORING LOCATION	DATE/TIME	7/24/98, 1530		7/25/98, 1000		7/26/98, 0845		7/27/98; 0900		7/28/98; 0800		7/31/98; 0900	
	PARAMETERS	FIELD	LAB	FIELD	LAB	FIELD	LAB	FIELD	LAB	FIELD	LAB	FIELD	LAB
EXTRACTION WELL (SVW-1)	CH_4(%)	0.0	0.1	0.0	0.047	0.0	0.019	0.0	0.018	0.0	0.018	0.0	0.0073
	TNMO (ppm)	NM	61	NM	580	NM	610	NM	670	NM	520	NM	210
	O_2(%)	20.1	19.9	18.5	17.7	16.4	15.7	15.4	14.4	14.7	13.8	19.9	20.2
	CO_2(%)	0.5	0.526	1.2	1.33	1.9	2.04	2.5	2.58	2.9	3.07	0.7	0.852
	Benzene (ppb)	NM	18	NM	41	NM	23	NM	24	NM	21	NM	14
	Vinyl Chloride (ppb)	NM	33	NM	140	NM	110	NM	94	NM	84	NM	38
	Total Organics (ppb)	NM	411.86	NM	2,080.3	NM	1,808.9	NM	3,815.3	NM	2,388.9	NM	1,196.2
	TCE (ppb)	NM	0.86	NM	3.6	NM	4.7	NM	5.6	NM	5.9	NM	<4.7
	PCE (ppb)	NM	2.1	NM	4.3	NM	5.3	NM	6.1	NM	6.5	NM	3.5

MONITORING LOCATION	DATE/TIME	8/4/98, 1330		8/7/98; 0730		8/18/98; 1430		8/25/98; 0920		9/10/98; 0930		9/25/98; 1025		10/7/98; 0900	
	PARAMETERS	FIELD	LAB	FIELD	LAB	FIELD	LAB	FIELD	LAB	FIELD	LAB	FIELD	LAB	FIELD	LAB
EXTRACTION WELL (SVW-1)	CH_4(%)	0.0	0.0051	0.0	0.01	0.0	0.0089	0.0	0	0.0	0.01	0.0	NS	0.0	NS
	TNMO (ppm)	NM	360	NM	72	NM	150	NM	86	NM	29	NM	NS	NM	NS
	O_2(%)	19.7	19.6	19.2	19.8	11.4	12.5	12.8	13	11.6	11.7	10.5	NS	11.2	NS
	CO_2(%)	0.6	0.737	0.8	0.87	5.8	5.7	5.8	6.1	6.2	6.8	6.4	NS	6.5	NS
	Benzene (ppb)	NM	14	NM	8.3	NM	<3.1	NM	<7.8	NM	<2.4	NM	NS	NM	NS
	Vinyl Chloride (ppb)	NM	30	NM	28	NM	4.7	NM	4.7	NM	<2.4	NM	NS	NM	NS
	Total Organics (ppb)	NM	11,3338	NM	509.3	NM	2,424.3	NM	689	NM	577.5	NM	NS	NM	NS
	TCE (ppb)	NM	2.8	NM	3.1	NM	7.6	NM	4.8	NM	2.7	NM	NS	NM	NS
	PCE (ppb)	NM	5.2	NM	3.6	NM	9.2	NM	8.6	NM	8.3	NM	NS	NM	NS

MONITORING LOCATION	DATE/TIME	10/9/98		11/5/98		11/19/98		12/15/98		1/18/99	
	PARAMETERS	FIELD	LAB	FIELD	LAB	FIELD	LAB	FIELD	LAB	FIELD	LAB
EXTRACTION WELL (SVW-1)	CH_4(%)	0.0	NS	0	NS	0.0053	NS	0.0044	NS	0.0	NS
	TNMO (ppm)	NM	NS	NM	NS	NM	NS	NM	NS	NM	NS
	O_2(%)	19	NS	18	NS	10.2	NS	11.2	NS	3.6	NS
	CO_2(%)	1.6	NS	2.6	NS	7.2	NS	7.0	NS	7.7	NS
	Benzene (ppb)	NM	NS	NM	NS	NM	NS	NM	NS	NM	NS
	Vinyl Chloride (ppb)	NM	NS	NM	NS	NM	NS	NM	NS	NM	NS
	Total Organics (ppb)	NM	NS	NM	NS	NM	NS	NM	NS	NM	NS
	TCE (ppb)	NM	NS	NM	NS	NM	NS	NM	NS	NM	NS
	PCE (ppb)	NM	NS	NM	NS	NM	NS	NM	NS	NM	NS

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NS = NO SAMPLE FOR LABORATORY ANALYSES WAS COLLECTED NM = NOT MEASURED NA = NOT APPLICABLE **BOLD NUMBERS** = CONCENTRATIONS ABOVE DETECTION LIMIT OR RECORDED FROM FIELD EQUIPMENT

TABLE 3.11

SUMMARY OF FIELD AND LABORATORY DATA FOR C&E DIE - DEEP ZONE SVE TEST REBOUND PERIOD
WASTE DISPOSAL, INC. SUPERFUND SITE

MONITORING LOCATION	DATE/TIME	8/7/98, 1100		8/10/98, 0930		8/14/98; 0915		8/18/98, 1430		8/21/98, 1100		8/25/98, 0920		9/10/98, 0930	
	PARAMETERS	FIELD	LAB	FIELD	LAB	FIELD	LAB	FIELD	LAB	FIELD	LAB	FIELD	LAB	FIELD	LAB
EXTRACTION WELL (DVW-1)	CH_4(%)	**0 6**	**1**	**0.0**	**0.23**	**0.2**	**0.13**	**0.0**	**0.051**	**0.0**	**0.065**	**0.0**	**0.038**	**0.1**	**0.0676**
	TNMO (ppm)	NM	**1,700**	NM	**1,600**	NM	**640**	NM	**1,100**	NM	**1,000**	NM	**570**	NM	**74**
	O_2(%)	**5.4**	**6.08**	**17.2**	**19 2**	**17.9**	**18.9**	**19**	**20.1**	**11.4**	**20**	**20.0**	**20.8**	**19.2**	**18.9**
	CO_2(%)	**14.6**	**14**	**2.5**	**2.84**	**1.6**	**1.81**	**0.7**	**0.777**	**5.8**	**1.05**	**0.4**	**0.57**	**0.6**	**1.2**
	Benzene (ppb)	NM	**140**	NM	<310	NM	**16**	NM	<16	NM	<16	NM	<7 8	NM	<2 2
	Vinyl Chloride (ppb)	NM	<79	NM	<390	NM	<16	NM	<20	NM	<20	NM	9 8	NM	<2 2
	Total Organics (ppb)	NM	**1,024**	NM	**47,500**	NM	**349**	NM	**13,837**	NM	**17,851**	NM	**8,862.4**	NM	**7,579.2**
	TCE (ppb)	NM	<38	NM	<190	NM	<7 5	NM	<9 3	NM	<9 3	NM	<4 7	NM	<2 2
	PCE (ppb)	NM	**150**	NM	<150	NM	**21**	NM	<7 4	NM	<7 4	NM	<3 7	NM	**4.5**

MONITORING LOCATION	DATE/TIME	9/25/98, 1025		10/7/98, 0900		10/9/98		11/5/98		11/19/98		12/16/98		1/18/99	
	PARAMETERS	FIELD	LAB	FIELD	LAB	FIELD	LAB	FIELD	LAB	FIELD	LAB	FIELD	LAB	FIELD	LAB
EXTRACTION WELL (DVW-1)	CH_4(%)	**0.0**	NS	**0.0**	NS	**0.4**	NS	**0.6**	NS	**0.6**	NS	**0.6**	NS	**0.0**	NS
	TNMO (ppm)	NM	NS	NM	NS	NM	NS	NM	NS	NM	NS	NM	NS	NM	NS
	O_2(%)	**19**	NS	**17**	NS	**0.0**	NS	**0.0**	NS	**0.0**	NS	**0.0**	NS	**0.6**	NS
	CO_2(%)	**0.8**	NS	**2.2**	NS	**15.0**	NS	**16.6**	NS	**17.8**	NS	**16.8**	NS	**19.8**	NS
	Benzene (ppb)	NM	NS	NM	NS	NM	NS	NM	NS	NM	NS	NM	NS	NM	NS
	Vinyl Chloride (ppb)	NM	NS	NM	NS	NM	NS	NM	NS	NM	NS	NM	NS	NM	NS
	Total Organics (ppb)	NM	NS	NM	NS	NM	NS	NM	NS	NM	NS	NM	NS	NM	NS
	TCE (ppb)	NM	NS	NM	NS	NM	NS	NM	NS	NM	NS	NM	NS	NM	NS
	PCE (ppb)	NM	NS	NM	NS	NM	NS	NM	NS	NM	NS	NM	NS	NM	NS

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NS = NO SAMPLE FOR LABORATORY ANALYSES WAS COLLECTED NM = NOT MEASURED NA = NOT APPLICABLE **BOLD NUMBERS** = CONCENTRATIONS ABOVE DETECTION LIMIT OR RECORDED FROM FIELD EQUIPMENT

TABLE 3.12

AREA 7
SVE START-UP AND OPERATIONAL PARAMETERS
WASTE DISPOSAL, INC. SUPERFUND SITE

PARAMETERS	SHALLOW WELL					DEEP WELL					AIR INJECTION VENTS (AIV)			
	SVW-1	SVP-1	SMP-1	SMP-2	SMP-3	DVW-1	DVP-1	DMP-1	DMP-2	DMP-3	AIV-1	AIV-2	AIV-3	AIV-4
	8/10/98; 0815	8/10/98; 0815	8/10/98; 0815	8/10/98; 0815	8/10/98; 0815	8/12/98; 0735	8/12/98; 0735	8/12/98; 0735	8/12/98; 0735	8/12/98; 0735	8/12/98; 0735	8/12/98; 0735	8/12/98; 0735	8/12/98; 0735
Wellhead Vacuum (Inches)	-10.0	-0.9	-0.25	-0.13	-0.04	-4.0	-0.4	-0.34	-0.28	-0.24	0.0	-0.26	-0.32	-0.24
Well Flow (Fpm)	100	--	--	--	--	40	--	--	--	--	--	--	--	--
Recycle Air (%)	50	--	--	--	--	10	--	--	--	--	--	--	--	--
Make Up Air (%)	70	--	--	--	--	30	--	--	--	--	--	--	--	--
Catalyst Temperatures (°C)														
• Inlet	739	--	--	--	--	735	--	--	--	--	--	--	--	--
• Center 1	698	--	--	--	--	860	--	--	--	--	--	--	--	--
• Center 2	NA	--	--	--	--	778	--	--	--	--	--	--	--	--
• Outlet	656	--	--	--	--	834	--	--	--	--	--	--	--	--

TABLE 3.13

SUMMARY OF FIELD AND LABORATORY DATA FOR AREA 7 - SHALLOW ZONE SVE TEST ACTIVE PHASE
WASTE DISPOSAL, INC. SUPERFUND SITE

MONITORING LOCATION	DATE/TIME	(Initial) 8/7/98; 1300	8/10/98; 0815		8/10/98; 1100		8/10/98; 1300		8/10/98; 1500		8/10/98: 1700		8/11/98; 0715		8/11/98; 1530		8/12/98; 0800		8/13/98; 1045		8/14/98; 1000		8/15/98; 0930		8/16/98; 0850		8/17/98; 0730	
	PARAMETERS	FIELD	FIELD	LAB	FIELD	LAB	FIELD	LAB	FIELD	LAB	FIELD	LAB	FIELD	LAB	FIELD	LAB	FIELD	LAB	FIELD	LAB	FIELD	LAB	FIELD	LAB	FIELD	LAB	FIELD	LAB
EXTRACTION WELL (SVW-1)	CH_4(%)	0.4	0.4	0.44	0.4	0.7	0.5	0.8	0.6	0.9	0.6	1	0.4	0.8	0.4	0.7	0.2	0.47	0.2	0.25	0.0	0.13	0.1	0.06	0.1	0.05	0.0	0.05
	TNMO (ppm)	NM	NM	3,900	NM	700	NM	570	NM	500	NM	520	NM	520	NM	460	NM	410	NM	280	NM	200	NM	52	NM	45	NM	42
	O_2(%)	0.0	0.0	1.79	3.5	4.1	5.4	6.1	6.6	7	7.0	7	9.3	7.7	7.3	8	8.0	8.18	9.4	9.24	7.8	8.21	8.1	7.8	8.2	7.8	8.4	8.4
	CO_2(%)	10.0	9.8	9.39	6.6	6.8	6.0	6.1	5.5	5.7	5.4	5.7	4.4	5.2	5.4	5.4	5.2	5.54	4.5	5.25	5.8	6.17	5.9	6.2	6.1	6.3	6.0	6
	Benzene (ppb)	NM	NM	<160	NM	<16	NM	<16	NM	<16	NM	<16	NM	9	NM	9.2	NM	9.4	NM	8.1	NM	6.6	NM	5.1	NM	4.7	NM	5
	Vinyl Chloride (ppb)	NM	NM	<200	NM	<20	NM	<20	NM	<20	NM	<20	NM	<7.9	NM	<7.9	NM	<7.9	NM	<7 9	NM	<7.9	NM	<1.5	NM	2.2	NM	<1.5
	Total Organics (ppb)	NM	NM	49,110	NM	501	NM	507	NM	791	NM	751	NM	419	NM	556	NM	187	NM	221	NM	104	NM	108	NM	1,549	NM	182
	TCE (ppb)	NM	NM	<94	NM	<9.4	NM	<9 4	NM	<9.4	NM	<9.4	NM	<3.8	NM	<3.8	NM	<3.8	NM	<3.8	NM	<3.8	NM	<1 5	NM	3.9	NM	<1.5
	PCE (ppb)	NM	NM	<75	NM	<7.5	NM	<7 5	NM	<7.5	NM	<7.5	NM	<3.0	NM	<3.0	NM	<3.0	NM	<3.0	NM	<3.0	NM	<1.5	NM	6.6	NM	<1.5
POST BLOWER	CH_4(%)	NM	NM	NM	0.0	0	0.0	0	0.0	0	0.0	0	0.1	0	0.0	0	0.0	0.01	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0.01
	TNMO (ppm)	NM	NM	NM	NM	50	NM	35	NM	34	NM	29	NM	21	NM	27	NM	30	NM	21	NM	23	NM	8	NM	6	NM	6
	O_2(%)	NM	NM	NM	20.4	22	20.4	23	20.5	22	20.5	22	20.7	22	20.7	22	20.5	21.9	20.6	22.1	20.4	22.1	20.2	20.6	20.4	20.6	20.3	20.6
	CO_2(%)	NM	NM	NM	0.0	0.1	0.0	0.1	0.0	0.1	0.0	0.1	0.0	0.1	0.0	0.1	0.0	0.11	0.0	0.07	0.0	0.08	0.0	0.07	0.0	0.08	0.0	0.08
	Benzene (ppb)	NM	NM	NM	NM	2.4	NM	1.7	NM	1.4	NM	1.7	NM	2.2	NM	1.1	NM	1	NM	2.4	NM	2.2	NM	3.3	NM	<1 4	NM	<1.5
	Vinyl Chloride (ppb)	NM	NM	NM	NM	<1.6	NM	<1.6	NM	<1 6	NM	<1.6	NM	<1 6	NM	<1.6	NM	<1 6	NM	<1.6	NM	<1.6	NM	<1.4	NM	<1.4	NM	<1 5
	Total Organics (ppb)	NM	NM	NM	NM	111	NM	52	NM	75	NM	68	NM	69	NM	43	NM	19.7	NM	70.4	NM	42	NM	44.6	NM	14	NM	11.1
	TCE (ppb)	NM	NM	NM	NM	<0.75	NM	<0.75	NM	<0.75	NM	<0.75	NM	<0.75	NM	<0.75	NM	<0.75	NM	<0 75	NM	<0.75	NM	<1 4	NM	<1.4	NM	<1.5
	PCE (ppb)	NM	NM	NM	NM	1.1	NM	0.6	NM	0.8	NM	0.6	NM	0.6	NM	0.6	NM	0.86	NM	0.66	NM	0.62	NM	<1.4	NM	<1.4	NM	<1.5
STACK	CH_4(%)	NM	NM	NM	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0.01	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0
	TNMO (ppm)	NM	NM	NM	NM	28	NM	26	NM	34	NM	23	NM	23	NM	21	NM	25	NM	20	NM	22	NM	6	NM	5	NM	5
	O_2(%)	NM	NM	NM	20.3	23	20.5	22	20.6	22	20.5	22	20.8	22	20.5	22	20.4	21.6	20.7	22.5	20.5	22.6	20.4	20.6	20.4	20.7	20.3	20.7
	CO_2(%)	NM	NM	NM	0.0	0.1	0.0	0.1	0.0	0.1	0.0	0.1	0.0	0.1	0.0	0.1	0.0	0.12	0.0	0.09	0.0	0.09	0.0	0.08	0.0	0.08	0.0	0.08
	Benzene (ppb)	NM	NM	NM	NM	1.1	NM	<1.3	NM	<1.3	NM	<1.3	NM	<1.3	NM	<1.3	NM	<1.3	NM	<1.3	NM	<1.3	NM	6.5	NM	<1.6	NM	<2.1
	Vinyl Chloride (ppb)	NM	NM	NM	NM	<1.6	NM	<1.6	NM	<1.6	NM	<1.6	NM	<1.6	NM	<1.6	NM	<1.6	NM	<1.6	NM	<1.6	NM	<1.5	NM	<1.6	NM	<2.1
	Total Organics (ppb)	NM	NM	NM	NM	55	NM	5.1	NM	11	NM	11	NM	15	NM	2.6	NM	4.7	NM	12.5	NM	28.4	NM	215	NM	(1)	NM	20.8
	TCE (ppb)	NM	NM	NM	NM	<0.75	NM	<0.75	NM	<0.75	NM	<0.75	NM	<0 75	NM	<0.75	NM	<0.75	NM	<0.75	NM	<0.75	NM	<1.5	NM	<1.6	NM	<2.1
	PCE (ppb)	NM	NM	NM	NM	0.9	NM	<0.60	NM	<0.60	NM	<0 60	NM	<0.60	NM	<0.60	NM	<0.60	NM	<0 60	NM	<0.60	NM	<1.5	NM	<1.6	NM	<2.1
READING ON UNIT	WELL FLOW (CFM)	NM	NM	NA	17	NA	18	NA	20	NA	36	NA	22	NA	32	NA	NM	NA	4	NA	36	NA	35	NA	36	NA	45	NA
	RA/MA	NM	NM	NA	50/30	NA	40/30	NA	40/30	NA	40/30	NA	40/30	NA	40/30	NA	40/30	NA	40/30	NA	40/30	NA	40/30	NA	40/30	NA	40/30	NA
	CORRECTED FLOW (CFM)(2)	NM	NM	NA	3	NA	4.5	NA	6	NA	10	NA	6.5	NA	9	NA		NA	13	NA	10	NA	10	NA	10	NA	15	NA
	VACUUM (in.)	NM	NM	NA	-10	NA	-14	NA	-14	NA	-13	NA	-14	NA	-14	NA	-14	NA	-11	NA	-11	NA	-11	NA	-13	NA	-15	NA
FIELD PRESSURE MEASUREMENTS (inch)	SVW-1 (EXT. Well)	0.0	NM	NA	-10.5	NA	-14.5	NA	-14.5	NA	-14.8	NA	-13.0	NA	-13.5	NA	-13.5	NA	-10.9	NA	-10.0	NA	-9.5	NA	-11.0	NA	-13.0	NA
	SVP-1 (10')	0.0	NM	NA	-0.9	NA	-1.4	NA	-1.4	NA	-1.4	NA	-1.0	NA	-1.2	NA	-1.3	NA	-1.1	NA	-1.1	NA	-1.1	NA	-1.2	NA	-1.4	NA
	SMP-1 (20')	0.0	NM	NA	-0.25	NA	-0.34	NA	-0.33	NA	-0.33	NA	-0.43	NA	-0.45	NA	-0.50	NA	-0.29	NA	-0.26	NA	-0.30	NA	-0.34	NA	-0.34	NA
	SMP-2 (40')	0 0	NM	NA	-0.13	NA	-0.16	NA	-0.15	NA	-0.16	NA	-0.22	NA	-0.25	NA	-0.25	NA	-0.13	NA	-0.18	NA	-0.13	NA	-0.20	NA	-0.20	NA
	SMP-3 (60')	-0 1	NM	NA	-0.04	NA	-0.05	NA	-0.05	NA	-0.05	NA	-0.07	NA	-0.10	NA	-0.15	NA	-0.06	NA	-0.01	NA	-0.08	NA	-0.10	NA	-0.08	NA
	AIV-1	0.0	NM	NA	NM	NA	NM	NA	NM	NA	NM	NA	NM	NA	NM	NA	NM	NA	NM	NA	NM	NA	NM	NA	NM	NA	NM	NA
	AIV-2	0.0	NM	NA	NM	NA	NM	NA	NM	NA	NM	NA	NM	NA	NM	NA	NM	NA	NM	NA	NM	NA	NM	NA	NM	NA	NM	NA
	AIV-3	0.0	NM	NA	NM	NA	NM	NA	NM	NA	NM	NA	NM	NA	NM	NA	NM	NA	NM	NA	NM	NA	NM	NA	NM	NA	NM	NA
	AIV-4	0.0	NM	NA	NM	NA	NM	NA	NM	NA	NM	NA	NM	NA	NM	NA	NM	NA	NM	NA	NM	NA	NM	NA	NM	NA	NM	NA

94-256/TM#9A.Rev 3 (3/1/99/rmm)

NM = NOT MEASURED NA = NOT APPLICABLE **BOLD NUMBERS** = CONCENTRATIONS ABOVE DETECTION LIMIT OR RECORDED FROM FIELD EQUIPMENT

(1) No constituents were detected above the reporting limit.

(2) Corrected wellhead flow calculated from total flow, adjusted for recycle and makeup air contribution.

TABLE 3.14

SUMMARY OF FIELD AND LABORATORY DATA FOR AREA 7 - SHALLOW ZONE SVE TEST REBOUND PERIOD
WASTE DISPOSAL, INC. SUPERFUND SITE

MONITORING LOCATION	DATE/TIME	8/18/98; 0830		8/19/98; 1100		8/20/98, 0800		8/24/98; 0930		8/27/98; 0845		9/1/98; 1000		9/10/98; 0930	
	PARAMETERS	FIELD	LAB	FIELD	LAB	FIELD	LAB	FIELD	LAB	FIELD	LAB	FIELD	LAB	FIELD	LAB
EXTRACTION WELL (SVW-1)	CH_4(%)	**0.0**	**0.0107**	**0.0**	**0.0104**	**0.0**	**0.031**	**0.0**	**0.0834**	**0.0**	**0.14**	**0.0**	**0.15**	**0.0**	**0.173**
	TNMO (ppm)	NM	**47**	NM	**104**	NM	**131**	NM	**171**	NM	**720**	NM	**252**	NM	**179**
	O_2(%)	**5.7**	**4.1**	**0.6**	**1.6**	**0.9**	**1.5**	**0.0**	**2.4**	**0.0**	**1.79**	**0.9**	**1**	**0.9**	**1.7**
	CO_2(%)	**9.8**	**7.8**	**10.6**	**9.7**	**11**	**10.4**	**12.9**	**11**	**14**	**12.5**	**13**	**12.6**	**10.3**	**11.3**
	Benzene (ppb)	NM	**2.3**	NM	**6**	NM	**9**	NM	**12**	NM	**13**	NM	**17**	NM	**19.4**
	Vinyl Chloride (ppb)	NM	<1	NM	<6	NM	<1.4	NM	<12	NM	<20	NM	<12	NM	<4.2
	Total Organics (ppb)	NM	**111**	NM	**1,753**	NM	**1,318**	NM	**3,731**	NM	**1,391.5**	NM	**5,552**	NM	**613.5**
	TCE (ppb)	NM	**1.2**	NM	<6	NM	**2**	NM	<12	NM	<9.3	NM	<12	NM	<4.2
	PCE (ppb)	NM	<1	NM	<6	NM	<1.4	NM	<12	NM	<7.4	NM	<12	NM	<4.2

MONITORING LOCATION	DATE/TIME	9/16/98; 0915		9/25/98, 1430		10/7/98; 0930		10/9/98		11/4/98		11/19/98		12/15/98		1/20/99	
	PARAMETERS	FIELD	LAB	FIELD	LAB	FIELD	LAB	FIELD	LAB	FIELD	LAB	FIELD	LAB	FIELD	LAB	FIELD	LAB
EXTRACTION WELL (SVW-1)	CH_4(%)	**0.0**	**0.2**	**0.0**	NS	**0.0**	NS	**0.0**	NS	**0.2**	NS	**0.056**	NS	**0.054**	NS	**0.1**	NS
	TNMO (ppm)	NM	**174**	NM	NS	NM	NS	NM	NS	NM	NS	NM	NS	NM	NS	NM	NS
	O_2(%)	**0.0**	**0.8**	**0.0**	NS	**0.0**	NS	**0.0**	NS	**0.1**	NS	**0.0**	NS	**0.0**	NS	**0.0**	NS
	CO_2(%)	**11.0**	**11**	**10.0**	NS	**9.2**	NS	**9.1**	NS	**8.5**	NS	**7.9**	NS	**7.7**	NS	**7.3**	NS
	Benzene (ppb)	NM	**17**	NM	NS	NM	NS	NM	NS	NM	NS	NM	NS	NM	NS	NM	NS
	Vinyl Chloride (ppb)	NM	**2.4**	NM	NS	NM	NS	NM	NS	NM	NS	NM	NS	NM	NS	NM	NS
	Total Organics (ppb)	NM	**402**	NM	NS	NM	NS	NM	NS	NM	NS	NM	NS	NM	NS	NM	NS
	TCE (ppb)	NM	<1.8	NM	NS	NM	NS	NM	NS	NM	NS	NM	NS	NM	NS	NM	NS
	PCE (ppb)	NM	<1.8	NM	NS	NM	NS	NM	NS	NM	NS	NM	NS	NM	NS	NM	NS

94-256/TM#9A.Rev 3 (2/26/99/mm)

NS = NO SAMPLE FOR LABORATORY ANALYSES WAS COLLECTED   NM = NOT MEASURED   NA = NOT APPLICABLE   **BOLD NUMBERS** = CONCENTRATIONS ABOVE DETECTION LIMIT OR RECORDED FROM FIELD EQUIPMENT

TABLE 3.15

SUMMARY OF FIELD AND LABORATORY DATA FOR AREA 7 - DEEP ZONE SVE TEST ACTIVE PHASE
WASTE DISPOSAL, INC. SUPERFUND SITE

MONITORING LOCATION	DATE/TIME	(Initial) 8/11/98; 1330	8/12/98, 0735		8/12/98; 0935		8/12/98; 1135		8/12/98, 1335		8/12/98, 1535		8/13/98; 1045		8/13/98; 1630	
	PARAMETERS	FIELD	FIELD	LAB	FIELD	LAB	FIELD	LAB	FIELD	LAB	FIELD	LAB	FIELD	LAB	FIELD	LAB
EXTRACTION WELL (DVW-1)	CH_4(%)	0.0	0.0	0.033	0.9	1.3	0.7	1.1	0.6	1	0.5	0.7	0.3	0.5	0.3	0.4
	TNMO (ppm)	NM	NM	2,200	NM	750	NM	590	NM	550	NM	500	NM	370	NM	400
	O_2(%)	20.9	21.5	22.3	0.4	1.39	0.2	1.6	0.2	1.6	0.6	7	1.7	1.7	1.2	1.8
	CO_2(%)	0.0	0.0	0.176	17.3	16.7	17.5	17	17.0	15	16.9	13	15.6	16	16.1	16
	Benzene (ppb)	NM	NM	<130	NM	<13	NM	<6.3	NM	<13	NM	<13	NM	<6.3	NM	<13
	Vinyl Chloride (ppb)	NM	NM	<160	NM	<16	NM	<7.9	NM	<16	NM	<16	NM	<7.9	NM	<15
	Total Organics (ppb)	NM	NM	54,960	NM	280	NM	250	NM	227	NM	216	NM	154	NM	68
	TCE (ppb)	NM	NM	<75	NM	<7.5	NM	<3.8	NM	<7.5	NM	<7.5	NM	<3.8	NM	<7.5
	PCE (ppb)	NM	NM	<60	NM	<6.0	NM	<3.0	NM	<6.0	NM	<6.0	NM	3.3	NM	<6.0
POST BLOWER	CH_4(%)	NM	NM	NM	0.3	0.569	0.3	0.5	0.3	0.5	0.3	0.5	0.2	0.4	0.2	0.3
	TNMO (ppm)	NM	NM	NM	NM	290	NM	240	NM	290	NM	270	NM	190	NM	180
	O_2(%)	NM	NM	NM	11.5	12.9	11.5	13	9.6	11	9.3	10	8.7	9.7	8.9	9.8
	CO_2(%)	NM	NM	NM	7.7	7.40	7.6	7.5	9.1	8.8	9.6	9.2	9.6	9.5	9.7	9.4
	Benzene (ppb)	NM	NM	NM	NM	<6.3	NM	<6.3	NM	<6.3	NM	<6.3	NM	<6.3	NM	<6.3
	Vinyl Chloride (ppb)	NM	NM	NM	NM	<7.9	NM	<7.9	NM	<7.9	NM	<7.9	NM	<7.9	NM	<7.9
	Total Organics (ppb)	NM	NM	NM	NM	99.3	NM	107	NM	91	NM	78	NM	63	NM	45
	TCE (ppb)	NM	NM	NM	NM	<3.8	NM	<3.8	NM	<3.8	NM	<3.8	NM	<3.8	NM	<3.8
	PCE (ppb)	NM	NM	NM	NM	<3.0	NM	< 3.0	NM	<3.0	NM	< 3.0	NM	2.1	NM	2.6
STACK	CH_4(%)	NM	NM	NM	0.0	0.289	0.0	0.03	0.0	0.1	0.0	0.2	0.1	0.3	0.1	0.2
	TNMO (ppm)	NM	NM	NM	NM	75	NM	80	NM	78	NM	80	NM	86	NM	91
	O_2(%)	NM	NM	NM	11.3	12.1	9.5	12	9.2	9.7	9.2	9.5	8.5	9.7	8.7	9.6
	CO_2(%)	NM	NM	NM	7.7	7.78	9.6	7.9	9.1	9.4	9.5	9.3	9.9	9.8	9.8	9.4
	Benzene (ppb)	NM	NM	NM	NM	<3.1	NM	<1.3	NM	<1.3	NM	<1.3	NM	<1.3	NM	<1.3
	Vinyl Chloride (ppb)	NM	NM	NM	NM	<3.9	NM	<1.6	NM	<1.6	NM	<1.6	NM	<1.6	NM	<1.6
	Total Organics (ppb)	NM	NM	NM	NM	544	NM	64	NM	42	NM	60	NM	48	NM	37
	TCE (ppb)	NM	NM	NM	NM	<1.9	NM	<0.75	NM	<0.75	NM	<0.75	NM	<0.75	NM	0.6
	PCE (ppb)	NM	NM	NM	NM	<1.5	NM	<0.60	NM	<0.60	NM	<0.60	NM	2.2	NM	<0.60
READING ON UNIT	WELL FLOW (CFM)	NM	NM	NA	40	NA	42	NA	42	NA	46	NA	49	NA	49	NA
	RA/MA	NM	NM	NA	10/30	NA	10/30	NA	10/30	NA	10/30	NA	10/30	NA	10/30	NA
	CORRECTED FLOW (CFM)[2]	NM	NM	NA	24	NA	25	NA	25	NA	28	NA	29	NA	29	NA
	VACUUM (in.)	NM	NM	NA	-4.0	NA	-4.0	NA	-4.5	NA	-4.5	NA	-6.0	NA	-6.0	NA
FIELD PRESSURE MEASUREMENTS (inch)	DVW-1 (EXT. Well)	0.0	NM	NA	-4.0	NA	-4.0	NA	4.5	NA	NM	NA	4.9	NA	-4.9	NA
	DVP-1 (10')	0.0	NM	NA	-0.40	NA	-0.40	NA	-0.44	NA	-0.53	NA	-0.90	NA	-0.54	NA
	DMP-1 (20')	0.0	NM	NA	-0.34	NA	-0.35	NA	-0.35	NA	-0.48	NA	-0.56	NA	-0.47	NA
	DMP-2 (40')	0.0	NM	NA	-0.28	NA	-0.30	NA	-0.35	NA	-0.42	NA	-0.45	NA	-0.36	NA
	DMP-3 (60')	-0.2	NM	NA	-0.24	NA	-0.25	NA	-0.25	NA	-0.32	NA	-0.39	NA	-0.32	NA
	AIV-1	0.0	NM	NA	0.0	NA	0.0	NA	0.0	NA	0.0	NA	0.0	NA	0.0	NA
	AIV-2	0.0	NM	NA	-0.26	NA	-0.20	NA	-0.25	NA	-0.35	NA	-0.40	NA	-0.39	NA
	AIV-3	0.0	NM	NA	-0.32	NA	-0.30	NA	-0.30	NA	-0.30	NA	-0.43	NA	-0.40	NA
	AIV-4	0.0	NM	NA	-0.24	NA	-0.25	NA	-0.35	NA	-0.35	NA	-0.36	NA	-0.33	NA

MONITORING LOCATION	DATE/TIME	8/14/98; 1015		8/15/98; 1900		8/16/98; 0900		8/17/98; 0745		8/18/98; 0800		8/18/98; 0930		8/19/98; 1115		8/20/98; 0815		8/21/98; 1015		8/24/98; 0900	
	PARAMETERS	FIELD	LAB	FIELD	LAB	FIELD	LAB	FIELD	LAB	FIELD	LAB	FIELD	LAB	FIELD	LAB	FIELD	LAB	FIELD	LAB	FIELD	LAB
EXTRACTION WELL (DVW-1)	CH_4(%)	0.2	0.5	0.2	0.3	0.2	0.3	0.1	0.2	0.0	0.12	0.0	NM	0.0	0.06	0.0	0.05	0.0	0.04	0.0	0.02
	TNMO (ppm)	NM	340	NM	101	NM	51	NM	54	NM	54	NM	NM	NM	44	NM	77	NM	76	NM	54
	O_2(%)	1.2	2.1	3.1	2.4	3.4	3	3.9	4.2	3.6	5.5	5.8	NM	7.8	8.4	10.7	10.5	12.0	11.4	13.0	13.6
	CO_2(%)	15.5	15	14.1	14	15.8	14	14.0	14	8.2	13	6.2	NM	12.6	11.8	10.6	10.5	9.4	10.2	8.5	7.9
	Benzene (ppb)	NM	<13	NM	2.7	NM	2.5	NM	2.1	NM	<1.4	NM	NM	NM	<1.4	NM	<1.8	NM	<1.6	NM	<1.5
	Vinyl Chloride (ppb)	NM	<16	NM	2.6	NM	3.3	NM	3.6	NM	3.2	NM	NM	NM	2.7	NM	2.1	NM	<1.6	NM	<1.5
	Total Organics (ppb)	NM	81	NM	152	NM	164	NM	182	NM	179	NM	NM	NM	420	NM	462	NM	461	NM	329
	TCE (ppb)	NM	<7.5	NM	1.7	NM	2.1	NM	3.1	NM	3.9	NM	NM	NM	9.1	NM	9.8	NM	12.7	NM	12.2
	PCE (ppb)	NM	4.2	NM	4.3	NM	4.9	NM	5.6	NM	5.1	NM	NM	NM	7.4	NM	7.1	NM	11.6	NM	6.2
POST BLOWER	CH_4(%)	0.1	0.3	0.0	0.2	0.0	0.3	0.0	0.2	0.0	0.12	NM	NM	0.0	0.07	0.0	0.04	0.0	0.04	0.0	0.02
	TNMO (ppm)	NM	200	NM	46	NM	62	NM	117	NM	52	NM	NM	NM	49	NM	651	NM	72	NM	55
	O_2(%)	8.8	9.9	9.1	9.9	10.0	3.4	3.5	5.5	4.2	5.6	NM	NM	7.7	8.6	9.5	10.8	11.0	11.7	12.5	13.6
	CO_2(%)	9.3	9	9.1	8.5	9.6	14	14.5	13	14.4	12.9	NM	NM	12.7	11.7	11.8	10.2	10.9	9.8	8.9	8
	Benzene (ppb)	NM	<6.3	NM	2.3	NM	2.6	NM	<2	NM	1.6	NM	NM	NM	<1.4	NM	<1.4	NM	<1.4	NM	<1.6
	Vinyl Chloride (ppb)	NM	<7.9	NM	1.8	NM	3	NM	2.5	NM	3.3	NM	NM	NM	2.8	NM	1.8	NM	<1.4	NM	<1.6
	Total Organics (ppb)	NM	66	NM	168	NM	266	NM	144	NM	191	NM	NM	NM	422	NM	444	NM	420	NM	367
	TCE (ppb)	NM	<3.8	NM	<1.6	NM	2	NM	3.4	NM	4.1	NM	NM	NM	9.9	NM	8.5	NM	11.4	NM	12.1
	PCE (ppb)	NM	3.4	NM	2.8	NM	4.9	NM	5.8	NM	5.4	NM	NM	NM	8	NM	6	NM	9.9	NM	6.3
STACK	CH_4(%)	0.0	0.2	0.0	0.2	0.0	0.2	0.0	0.2	0.0	0.11	NM	NM	0.0	0.06	0.0	0.05	0.0	0.04	0.0	0.02
	TNMO (ppm)	NM	71	NM	23	NM	28	NM	26	NM	26	NM	NM	NM	43	NM	71	NM	67	NM	50
	O_2(%)	8.8	10	9.1	9.9	9.3	3.4	4.1	4.8	4.2	5.6	NM	NM	7.7	8.6	9.4	10.1	10.9	11.4	12.6	13.8
	CO_2(%)	9.5	9.5	9.1	8.5	9.6	14	13.9	13	12.9	12.8	NM	NM	12.9	11.6	11.8	10.9	10.9	10.2	8.9	7.5
	Benzene (ppb)	NM	<1.3	NM	<1.5	NM	<1.5	NM	<1.5	NM	<0.8	NM	NM	NM	6.7	NM	4.9	NM	4.4	NM	2.5
	Vinyl Chloride (ppb)	NM	<1.6	NM	<1.5	NM	<1.5	NM	<1.5	NM	<0.8	NM	NM	NM	1.9	NM	2.5	NM	2	NM	<1.9
	Total Organics (ppb)	NM	63	NM	57	NM	60	NM	114	NM	121	NM	NM	NM	353	NM	352	NM	357	NM	637
	TCE (ppb)	NM	<0.75	NM	<1.5	NM	<1.5	NM	<1.5	NM	<0.8	NM	NM	NM	7.4	NM	8	NM	10.5	NM	12
	PCE (ppb)	NM	<0.60	NM	<1.5	NM	<1.5	NM	<1.5	NM	<0.8	NM	NM	NM	8	NM	6.6	NM	10.1	NM	6.2
READING ON UNIT	WELL FLOW (CFM)	49	NA	49	NA	52	NA	50	NA	56	NA	61	NA	86	NA	58	NA	79	NA	72	NA
	RA/MA	10/30	NA	10/30	NA	10/30	NA	15/30	NA	0/40	NA	0/20	NA	0/20	NA	0/20	NA	0/20	NA	0/20	NA
	CORRECTED FLOW (CFM)[2]	29	NA	29	NA	31	NA	30	NA	35	NA	50	NA	69	NA	46	NA	63	NA	57	NA
	VACUUM (in.)	-6.0	NA	-6.0	NA	-8	NA	-10	NA	-12	NA	-30	NA	-30	NA	-31	NA	-30	NA	-30	NA
FIELD PRESSURE MEASUREMENTS (inch)	DVW-1 (EXT. Well)	-5.0	NA	-5.0	NA	-5.5	NA	-9.0	NA	-10.0	NA	NM	NA	-26.5	NA	-26.5	NA	-26.5	NA	-26.5	NA
	DVP-1 (10')	-0.64	NA	-0.74	NA	-0.78	NA	-1.3	NA	-1.7	NA	NM	NA	-6.0	NA	-3.4	NA	-3.5	NA	-3.4	NA
	DMP-1 (20')	-0.50	NA	-0.64	NA	-0.65	NA	-1.0	NA	-1.5	NA	NM	NA	-5.0	NA	-3.0	NA	-3.1	NA	-3.1	NA
	DMP-2 (40')	-0.41	NA	-0.46	NA	-0.45	NA	-0.75	NA	-1.1	NA	NM	NA	-4.0	NA	-2.4	NA	-2.5	NA	-2.4	NA
	DMP-3 (60')	-0.40	NA	-0.48	NA	-0.50	NA	-0.70	NA	-1.0	NA	NM	NA	-4.0	NA	-2.4	NA	-2.2	NA	-2.1	NA
	AIV-1	0.0	NA	-0.01	NA	-0.01	NA	-0.01	NA	0.0	NA	NM	NA	0.0	NA	-0.02	NA	0.0	NA	0.0	NA
	AIV-2	-0.45	NA	-0.51	NA	-0.50	NA	-0.78	NA	-1.1	NA	NM	NA	-2.4	NA	-2.3	NA	-2.4	NA	-2.3	NA
	AIV-3	-0.49	NA	-0.54	NA	-0.55	NA	-0.82	NA	-1.2	NA	NM	NA	-2.6	NA	-2.5	NA	-2.4	NA	-2.5	NA
	AIV-4	-0.38	NA	-0.46	NA	-0.50	NA	-0.74	NA	-1.0	NA	NM	NA	-2.3	NA	-2.2	NA	-2.3	NA	-2.2	NA

NM = NOT MEASURED NA = NOT APPLICABLE **BOLD NUMBERS** = CONCENTRATIONS ABOVE DETECTION LIMIT OR RECORDED FROM FIELD EQUIPMENT

(1) No constituents were detected above the reporting limit.

(2) Corrected wellhead flow calculated from total flow, adjusted for recycle and makeup air contribution.

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TABLE 3.16

SUMMARY OF FIELD AND LABORATORY DATA FOR AREA 7 - DEEP ZONE SVE TEST REBOUND PERIOD
WASTE DISPOSAL, INC. SUPERFUND SITE

MONITORING LOCATION	DATE/TIME	8/24/98: 1130		8/25/98: 0930		8/26/98: 1130		8/27/98: 0845		9/1/98: 1000		9/4/98: 0830		9/10/98: 0900	
	PARAMETERS	FIELD	LAB	FIELD	LAB	FIELD	LAB	FIELD	LAB	FIELD	LAB	FIELD	LAB	FIELD	LAB
EXTRACTION WELL (DVW-1)	CH_4(%)	**0.0**	**0.0121**	**0.0**	<0.0002	**0.0**	**0.0014**	**0.0**	**0.002**	**0.0**	**0.0245**	**0.0**	**0.0564**	**0.0**	**0.0194**
	TNMO (ppm)	NM	**29**	NM	**25**	NM	**390**	NM	**150**	NM	**78**	NM	**163**	NM	**55**
	O_2(%)	**15.1**	**15.9**	**20.5**	**20.8**	**21**	**21.7**	**20.5**	**21.7**	**18**	**18.5**	**16.2**	**16.5**	**16.6**	**19.9**
	CO_2(%)	**5.9**	**5.2**	**0.0**	**0.0585**	**0.0**	**0.094**	**0.0**	**0.101**	**1.2**	**1**	**1.6**	**1.7**	**1.4**	**0.3**
	Benzene (ppb)	NM	<1.4	NM	<1.4	NM	<16	NM	<3.1	NM	<2.9	NM	<6	NM	<1.4
	Vinyl Chloride (ppb)	NM	<1.4	NM	<1.4	NM	<20	NM	**6.7**	NM	<2.9	NM	<6	NM	<1.4
	Total Organics (ppb)	NM	**366.3**	NM	**4,354.5**	NM	**9,990**	NM	**3,448.9**	NM	**5,613.7**	NM	**2,249.1**	NM	**3,923.1**
	TCE (ppb)	NM	<1.4	NM	<1.4	NM	<9.3	NM	<1.9	NM	<2.9	NM	<6	NM	<1.4
	PCE (ppb)	NM	<1.4	NM	<1.4	NM	<7.4	NM	<1.5	NM	<2.9	NM	<6	NM	<1.4

MONITORING LOCATION	DATE/TIME	9/16/98: 0915		9/25/98: 1430		10/7/98: 0930		10/9/98		11/4/98		11/19/98		12/16/98		1/18/99	
	PARAMETERS	FIELD	LAB	FIELD	LAB	FIELD	LAB	FIELD	LAB	FIELD	LAB	FIELD	LAB	FIELD	LAB	FIELD	LAB
EXTRACTION WELL (DVW-1)	CH_4(%)	**0.0**	**0.0291**	**0.0**	NS	**0.0**	NS	**0.2**	NS	**0.6**	NS	**0.6**	NS	**0.5**	NS	**0.6**	NS
	TNMO (ppm)	NM	**31**	NM	NS	NM	NS	NM	NS	NM	NS	NM	NS	NM	NS	NM	NS
	O_2(%)	**20.1**	**20**	**15**	NS	**18**	NS	**0.0**	NS	**0.0**	NS	**0.0**	NS	**0.0**	NS	**0.0**	NS
	CO_2(%)	**0.3**	**0.3**	**2.2**	NS	**1.1**	NS	**10.0**	NS	**12.1**	NS	**12.7**	NS	**12.4**	NS	**13.7**	NS
	Benzene (ppb)	NM	<1.6	NM	NS	NM	NS	NM	NS	NM	NS	NM	NS	NM	NS	NM	NS
	Vinyl Chloride (ppb)	NM	<1.6	NM	NS	NM	NS	NM	NS	NM	NS	NM	NS	NM	NS	NM	NS
	Total Organics (ppb)	NM	**2,932**	NM	NS	NM	NS	NM	NS	NM	NS	NM	NS	NM	NS	NM	NS
	TCE (ppb)	NM	<1.6	NM	NS	NM	NS	NM	NS	NM	NS	NM	NS	NM	NS	NM	NS
	PCE (ppb)	NM	<1.6	NM	NS	NM	NS	NM	NS	NM	NS	NM	NS	NM	NS	NM	NS

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NS = NO SAMPLE FOR LABORATORY ANALYSES WAS COLLECTED NM = NOT MEASURED NA = NOT APPLICABLE **BOLD NUMBERS** = CONCENTRATIONS ABOVE DETECTION LIMIT OR RECORDED FROM FIELD EQUIPMENT

TABLE 3.17

AREA 8
SVE START-UP AND OPERATIONAL PARAMETERS
WASTE DISPOSAL, INC. SUPERFUND SITE

PARAMETERS	SHALLOW WELL					DEEP WELL					AIR INJECTION VENTS (AIV)			
	SVW-1	SVP-1	SMP-1	SMP-2	SMP-3	DVW-1	DVP-1	DMP-1	DMP-2	DMP-3	AIV-1	AIV-2	AIV-3	AIV-4
	9/10/98; 0930	9/10/98; 0930	9/10/98; 0930	9/10/98; 0930	9/10/98; 0930	9/17/98; 0800	9/17/98; 0800	9/17/98; 0800	9/17/98; 0800	9/17/98; 0800	9/17/98; 0800	9/17/98; 0800	9/17/98; 0800	9/17/98; 0800
Wellhead Vacuum (Inches)	-2.0	-0.2	-0.4	-0.3	-0.2	-10	-3.0	-2.0	-1.0	-1.0	-2.8	-2.8	-2.8	-2.6
Well Flow (Fpm)	810	--	--	--	--	1315	--	--	--	--	--	--	--	--
Recycle Air (%)	10	--	--	--	--	50	--	--	--	--	--	--	--	--
Make Up Air (%)	90	--	--	--	--	0	--	--	--	--	--	--	--	--
Catalyst Temperatures (°C)														
• Inlet	718	--	--	--	--	725	--	--	--	--	--	--	--	--
• Center 1	735	--	--	--	--	732	--	--	--	--	--	--	--	--
• Center 2	724	--	--	--	--	731	--	--	--	--	--	--	--	--
• Outlet	730	--	--	--	--	720	--	--	--	--	--	--	--	--

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TABLE 3.18

SUMMARY OF FIELD AND LABORATORY DATA FOR AREA 8 - SHALLOW ZONE SVE TEST ACTIVE PHASE
WASTE DISPOSAL, INC. SUPERFUND SITE

MONITORING LOCATION	DATE/TIME	(Initial) 9/9/98; 1100	9/10/98; 0800		9/10/98; 1045		9/10/1998(1); 1145		9/10/98; 1415		9/10/98; 1600		9/11/98; 0815		9/11/98; 1430		9/14/98; 0845		9/15/98; 1245		9/16/98; 1030	
	PARAMETERS	FIELD	FIELD	LAB	FIELD	LAB	FIELD	LAB	FIELD	LAB	FIELD	LAB	FIELD	LAB	FIELD	LAB	FIELD	LAB	FIELD	LAB	FIELD	LAB
EXTRACTION WELL (SVW-1)	CH_4(%)	**0.1**	**0.2**	<0.0002	**0.1**	<0.0002	NM	NM	NM	NM	**0.0**	**0.004**	**0.0**	**0.003**	**0.1**	**0.02**	**0.0**	**0.004**	**0.0**	**0.01**	**0.0**	**0.003**
	TNMO (ppm)	NM	NM	**669**	NM	**6**	NM	NM	NM	NM	NM	**346**	NM	**106**	NM	**55**	NM	**23**	NM	**18**	NM	<2
	O_2(%)	**3.6**	**3.4**	**4.7**	**11.4**	**20.7**	NM	NM	NM	NM	**4.8**	**6.4**	**9.6**	**9.9**	**10.3**	**12.2**	**13.4**	**15.3**	**13.3**	**14.9**	**19.3**	**19.1**
	CO_2(%)	**14.4**	**14.2**	**13**	**7.5**	**0.04**	NM	NM	NM	NM	**14.0**	**13.5**	**12.5**	**12.3**	**9.2**	**10.3**	**4.1**	**5**	**3.9**	**4.8**	**1.1**	**1.3**
	Benzene (ppb)	NM	NM	<6	NM	<1.5	NM	NM	NM	NM	NM	<3	NM	<1.7	NM	<3.1	NM	<1.5	NM	<1.5	NM	<1.8
	Vinyl Chloride (ppb)	NM	NM	**8**	NM	<1.5	NM	NM	NM	NM	NM	<3	NM	<1.7	NM	<3.1	NM	<1.5	NM	<1.5	NM	<1.8
	Total Organics (ppb)	NM	NM	**7,529**	NM	**17.8**	NM	NM	NM	NM	NM	**1,990.7**	NM	**377**	NM	**252**	NM	**85.1**	NM	**138**	NM	**83**
	TCE (ppb)	NM	NM	<6	NM	<1.5	NM	NM	NM	NM	NM	<1.7	NM	<1.7	NM	<3.1	NM	**3**	NM	**3.4**	NM	<1.8
	PCE (ppb)	NM	NM	**19**	NM	<1.5	NM	NM	NM	NM	NM	**20.2**	NM	**21.5**	NM	**23.6**	NM	**29.7**	NM	**32.9**	NM	**14.6**
POST BLOWER	CH_4(%)	NM	NM	NM	**0.0**	<0.0002	NM	NM	NM	NM	**0.0**	<0.0002	**0.0**	<0.0002	**0.0**	**0.0007**	**0.0**	**0.0003**	**0.0**	**0.0003**	**0.0**	**0.0008**
	TNMO (ppm)	NM	NM	NM	NM	**8**	NM	NM	NM	NM	NM	**20**	NM	**8**	NM	**9**	NM	**8**	NM	**6**	NM	**4**
	O_2(%)	NM	NM	NM	**13.4**	**20.9**	NM	NM	NM	NM	**20.6**	**21**	**20.4**	**20.7**	**18.1**	**20.4**	**18.2**	**20.6**	**18.2**	**20.6**	**20.6**	**20.3**
	CO_2(%)	NM	NM	NM	**7.3**	**0.04**	NM	NM	NM	NM	**0.0**	**0.06**	**0.0**	**0.08**	**0.3**	**0.35**	**0.1**	**0.18**	**0.0**	**0.18**	**0.2**	**0.3**
	Benzene (ppb)	NM	NM	NM	NM	<1.5	NM	NM	NM	NM	NM	<2.6	NM	<2.2	NM	<1.8	NM	<1.4	NM	<1.5	NM	<1.4
	Vinyl Chloride (ppb)	NM	NM	NM	NM	<1.5	NM	NM	NM	NM	NM	<2.6	NM	<2.2	NM	<1.8	NM	<1.4	NM	<1.5	NM	<1.4
	Total Organics (ppb)	NM	NM	NM	NM	**15.5**	NM	NM	NM	NM	NM	**60.3**	NM	**12**	NM	**30.5**	NM	**21.3**	NM	**28.7**	NM	**25.1**
	TCE (ppb)	NM	NM	NM	NM	<1.5	NM	NM	NM	NM	NM	<2.6	NM	<2.2	NM	<1.8	NM	<1.4	NM	<1.5	NM	<1.4
	PCE (ppb)	NM	NM	NM	NM	<1.5	NM	NM	NM	NM	NM	**<2.6**	NM	<2.2	NM	<1.8	NM	**1.3**	NM	<1.5	NM	**3.3**
STACK	CH_4(%)	NM	NM	NM	**0.0**	<0.0002	NM	NM	NM	NM	**0.0**	<0.0002	**0.0**	<0.0002	**0.0**	**0.0003**	**0.0**	<0.0002	**0.0**	<0.0002	**0.0**	<0.0002
	TNMO (ppm)	NM	NM	NM	NM	**12**	NM	NM	NM	NM	NM	**8**	NM	<2	NM	<2	NM	**5**	NM	**5**	NM	<2
	O_2(%)	NM	NM	NM	**5.2**	**20.7**	NM	NM	NM	NM	**20.6**	**20.9**	**20.4**	**20.9**	**18.2**	**20.6**	**18.2**	**20.6**	**18.3**	**20.6**	**20.6**	**20.4**
	CO_2(%)	NM	NM	NM	**11.9**	**0.04**	NM	NM	NM	NM	**0.0**	**0.06**	**0.0**	**0.08**	**0.3**	**0.35**	**0.1**	**0.18**	**0.0**	**0.17**	**0.2**	**0.3**
	Benzene (ppb)	NM	NM	NM	NM	<1.7	NM	NM	NM	NM	NM	<1.5	NM	<1.9	NM	<1.7	NM	<1.4	NM	<1.5	NM	<2.1
	Vinyl Chloride (ppb)	NM	NM	NM	NM	<1.7	NM	NM	NM	NM	NM	<1.5	NM	<1.9	NM	<1.7	NM	<1.4	NM	<1.5	NM	<2.1
	Total Organics (ppb)	NM	NM	NM	NM	**18.7**	NM	NM	NM	NM	NM	(2)	NM	(2)	NM	(2)	NM	(2)	NM	**1.6**	NM	**4.9**
	TCE (ppb)	NM	NM	NM	NM	<1.7	NM	NM	NM	NM	NM	<1.5	NM	<1.9	NM	<1.7	NM	<1.4	NM	<1.5	NM	<2.1
	PCE (ppb)	NM	NM	NM	NM	<1.7	NM	NM	NM	NM	NM	<1.5	NM	<1.9	NM	<1.7	NM	<1.4	NM	<1.5	NM	<2.1
READING ON UNIT	WELL FLOW (CFM)	NM	0	NA	17.2	NA	NM	NA	14	NA	13	NA	8.15	NA	41	NA	35	NA	42.5	NA	75	NA
	RA/MA	NM	0	NA	0	NA	NM	NA	10/10	NA	10/10	NA	20/20	NA	15/20	NA	15/20	NA	15/20	NA	15/20	NA
	CORRECTED FLOW (CFM)(3)	NM	--	NA	17.2	NA	NM	NA	11.2	NA	11	NA	5.3	NA	27	NA	23	NA	27	NA	4	NA
	VACUUM (in.)	NM	0	NA	-4.0	NA	NM	NA	-2.0	NA	-2.0	NA	-4.0	NA	-20.0	NA	-20	NA	-20	NA	-40	NA
FIELD PRESSURE MEASUREMENTS (inch)	SVW-1 (EXT. Well)	0.0	0.0	NA	0.8	NA	NM	NA	1.95	NA	1.95	NA	-3.7	NA	-20.0	NA	-20	NA	-20	NA	-(>30)	NA
	SVP-1 (10')	0.0	0.0	NA	0.8	NA	NM	NA	0.2	NA	0.05	NA	0.0	NA	0.0	NA	-0.06	NA	-0.01	NA	-0.06	NA
	SMP-1 (20')	0.1	-0.01	NA	0.1	NA	NM	NA	0.4	NA	0.02	NA	-0.03	NA	-0.03	NA	-0.08	NA	-0.06	NA	-0.12	NA
	SMP-2 (40')	0.1	-0.01	NA	0.0	NA	NM	NA	0.3	NA	0.01	NA	-0.01	NA	-0.10	NA	-0.04	NA	-0.04	NA	-0.06	NA
	SMP-3 (60')	0.0	-0.0	NA	0.0	NA	NM	NA	0.2	NA	0.01	NA	-0.01	NA	-0.01	NA	-0.01	NA	0.0	NA	0.0	NA
	AIV-1	0.0	NM	NA	NM	NA	NM	NA	NM	NA	NM	NA	NM	NA	NM	NA	-0.16	NA	+0.16	NA	-0.13	NA
	AIV-2	0.0	NM	NA	NM	NA	NM	NA	NM	NA	NM	NA	NM	NA	NM	NA	-0.16	NA	+0.14	NA	-0.11	NA
	AIV-3	0.0	NM	NA	NM	NA	NM	NA	NM	NA	NM	NA	NM	NA	NM	NA	-0.22	NA	+0.18	NA	-0.06	NA
	AIV-4	0.0	NM	NA	NM	NA	NM	NA	NM	NA	NM	NA	NM	NA	NM	NA	-0.20	NA	+0.18	NA	-0.07	NA

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NM = NOT MEASURED   NA = NOT APPLICABLE   **BOLD NUMBERS** = CONCENTRATIONS ABOVE DETECTION LIMIT OR RECORDED FROM FIELD EQUIPMENT

(1) Unit was shut down at 11:45 and replaced with other unit that was started at 14:15.

(2) No constituents were detected above the reporting limits.

(3) Corrected wellhead flow calculated from total flow, adjusted for recycle and makeup air contribution.

TABLE 3.19

SUMMARY OF FIELD AND LABORATORY DATA FOR AREA 8 - SHALLOW ZONE SVE TEST REBOUND PERIOD
WASTE DISPOSAL, INC. SUPERFUND SITE

MONITORING LOCATION	DATE	9/17/98: 0735		9/18/98: 0830		9/24/98: 0930		9/28/98: 1000		10/2/98: 0645		10/6/98: 1020		10/19/98		11/5/98		11/20/98		12/17/98		1/18/99	
	PARAMETERS	FIELD	LAB	FIELD	LAB	FIELD	LAB	FIELD	LAB	FIELD	LAB	FIELD	LAB	FIELD	LAB	FIELD	LAB	FIELD	LAB	FIELD	LAB	FIELD	LAB
EXTRACTION WELL (SVW-1)	CH_4(%)	**0.0**	**0.001**	**0.0**	<0.0002	**0.0**	<0.0002	**0.0**	<0.0002	**0.0**	**0.0003**	**0.0**	NS	**1.4**	NS	**1.9**	NS	**0.005**	NS	**0.0**	NS	**0.0**	NS
	TNMO (ppm)	NM	**11**	NM	**20**	NM	**27**	NM	**31**	NM	**32**	NM	NS	NM	NS	NM	NS	NM	NS	NM	NS	NM	NS
	O_2(%)	**20.3**	**20.1**	**18.2**	**20.4**	**12**	**12**	**18**	**9.3**	**8.5**	**8.4**	**8.6**	NS	**0.0**	NS	**0.3**	NS	**0.0**	NS	**0.0**	NS	**0.0**	NS
	CO_2(%)	**0.4**	**0.3**	**0.3**	**0.2**	**2.0**	**2.2**	**1.0**	**4.9**	**6.3**	**7**	**7.8**	NS	**15.8**	NS	**16.8**	NS	**9.4**	NS	**11**	NS	**10.1**	NS
	Benzene (ppb)	NM	<1.3	NM	<1.4	NM	<1.4	NM	<1.4	NM	<0.8	NM	NS	NM	NS	NM	NS	NM	NS	NM	NS	NM	NS
	Vinyl Chloride (ppb)	NM	<1.5	NM	<1.4	NM	<1.4	NM	<1.4	NM	<0.8	NM	NS	NM	NS	NM	NS	NM	NS	NM	NS	NM	NS
	Total Organics (ppb)	NM	**35**	NM	**704.3**	NM	**922**	NM	**2,445.6**	NM	**857.2**	NM	NS	NM	NS	NM	NS	NM	NS	NM	NS	NM	NS
	TCE (ppb)	NM	<1.5	NM	<1.4	NM	<1.4	NM	<1.4	NM	**1.3**	NM	NS	NM	NS	NM	NS	NM	NS	NM	NS	NM	NS
	PCE (ppb)	NM	**4**	NM	**6.2**	NM	<1.4	NM	**17.6**	NM	**14.8**	NM	NS	NM	NS	NM	NS	NM	NS	NM	NS	NM	NS

94-256/TM#9A.Rev 3 (2/26/99/mm)

NS = NO SAMPLE FOR LABORATORY ANALYSES WAS COLLECTED   NM = NOT MEASURED   NA = NOT APPLICABLE   **BOLD NUMBERS** = CONCENTRATIONS ABOVE DETECTION LIMIT OR RECORDED FROM FIELD EQUIPMENT

TABLE 3.20

SUMMARY OF FIELD AND LABORATORY DATA FOR AREA 8 - DEEP ZONE SVE TEST ACTIVE PHASE WASTE DISPOSAL, INC. SUPERFUND SITE

MONITORING LOCATION	DATE/TIME	(Initial) 9/16/98	9/17/98; 0735		9/17/98; 1000		9/17/98; 1200		9/17/98; 1400		9/17/98; 1600		9/18/98; 0830		9/18/98; 1500	
	PARAMETERS	FIELD	FIELD	LAB	FIELD	LAB	FIELD	LAB	FIELD	LAB	FIELD	LAB	FIELD	LAB	FIELD	LAB
EXTRACTION WELL (DVW-1)	CH_4(%)	**0.0**	**0.0**	<0.0002	**0.0**	**0.0007**	**0.0**	**0.0013**	**0.0**	**0.0018**	**0.0**	**0.0018**	**0.0**	**0.009**	**0.0**	**0.0186**
	TNMO (ppm)	NM	NM	**51**	NM	**35**	NM	**29**	NM	**32**	NM	**25**	NM	**28**	NM	**28**
	O_2(%)	**20.5**	**20.7**	**20.3**	**8.7**	**9**	**9.0**	**8.8**	**10.5**	**8.8**	**7.9**	**8.7**	**7.2**	**8**	**7.4**	**7.4**
	CO_2(%)	**0.4**	**0.3**	**0.2**	**11.5**	**12.3**	**11.5**	**12.6**	**10.3**	**12.9**	**12.0**	**12.8**	**11.9**	**13**	**12.5**	**13.3**
	Benzene (ppb)	NM	NM	<1.4	NM	<1.4	NM	<1.6	NM	<1.5	NM	<1.5	NM	<1.4	NM	<1.5
	Vinyl Chloride (ppb)	NM	NM	<1.4	NM	<1.4	NM	<1.6	NM	<1.5	NM	<1.5	NM	<1.4	NM	<1.5
	Total Organics (ppb)	NM	NM	**9,222.8**	NM	**1,967.4**	NM	**1,821.4**	NM	**1,619.8**	NM	**1,553**	NM	**1,068**	NM	**1,042.7**
	TCE (ppb)	NM	NM	<1.4	NM	**30.5**	NM	**28**	NM	**28.3**	NM	**34**	NM	**25.2**	NM	**22.5**
	PCE (ppb)	NM	NM	**91.2**	NM	**1,920**	NM	**1,740**	NM	**1,540**	NM	**1,460**	NM	**939**	NM	**930**
POST BLOWER	CH_4(%)	NM	NM	NM	**0.0**	**0.0006**	**0.0**	**0.0012**	**0.0**	**0.0016**	**0.0**	**0.0016**	**0.0**	**0.008**	**0.0**	**0.0177**
	TNMO (ppm)	NM	NM	NM	NM	**29**	NM	**30**	NM	**30**	NM	**24**	NM	**24**	NM	**28**
	O_2(%)	NM	NM	NM	**8.9**	**9.8**	**8.9**	**9.8**	**9.1**	**9.7**	**8.1**	**9.4**	**7.0**	**8.7**	**7.8**	**8.3**
	CO_2(%)	NM	NM	NM	**11.3**	**11.4**	**11.5**	**11.5**	**11.6**	**12**	**11.8**	**12**	**12.2**	**12.3**	**12.2**	**12.4**
	Benzene (ppb)	NM	NM	NM	NM	<1.4	NM	<1.5	NM	<1.6	NM	<1.7	NM	<1.6	NM	<1.7
	Vinyl Chloride (ppb)	NM	NM	NM	NM	<1.4	NM	<1.5	NM	<1.6	NM	<1.7	NM	<1.6	NM	<1.7
	Total Organics (ppb)	NM	NM	NM	NM	**1,817.2**	NM	**1,793**	NM	**1,547.1**	NM	**1,436.1**	NM	**734**	NM	**740.7**
	TCE (ppb)	NM	NM	NM	NM	**29**	NM	**27.1**	NM	**26**	NM	**31.3**	NM	**22.2**	NM	**21.2**
	PCE (ppb)	NM	NM	NM	NM	**1,780**	NM	**1,740**	NM	**1,480**	NM	**1,360**	NM	**604**	NM	**614**
STACK	CH_4(%)	NM	NM	NM	**0.0**	**0.0005**	**0.0**	**0.0011**	**0.0**	**0.0008**	**0.0**	**0.0015**	**0.0**	**9.008**	**0.0**	**0.0165**
	TNMO (ppm)	NM	NM	NM	NM	**26**	NM	**27**	NM	**26**	NM	**22**	NM	**25**	NM	**24**
	O_2(%)	NM	NM	NM	**8.9**	**9.9**	**9.0**	**9.7**	**9.2**	**9.98**	**8.0**	**9.5**	**6.9**	**8.7**	**7.9**	**8.3**
	CO_2(%)	NM	NM	NM	**11.3**	**11.4**	**11.5**	**11.6**	**11.7**	**11.8**	**11.7**	**12**	**12.0**	**12.2**	**11.9**	**12.6**
	Benzene (ppb)	NM	NM	NM	NM	<1.4	NM	<1.5	NM	<1.5	NM	<1.4	NM	<1.5	NM	<1.7
	Vinyl Chloride (ppb)	NM	NM	NM	NM	<1.4	NM	<1.5	NM	<1.5	NM	<1.4	NM	<1.5	NM	<1.7
	Total Organics (ppb)	NM	NM	NM	NM	**20.7**	NM	**17.6**	NM	**25.1**	NM	**11.2**	NM	**32.6**	NM	**81.3**
	TCE (ppb)	NM	NM	NM	NM	<1.4	NM	<1.5	NM	<1.5	NM	<1.4	NM	<1.5	NM	<1.7
	PCE (ppb)	NM	NM	NM	NM	**12.1**	NM	**10**	NM	**5.5**	NM	**6.8**	NM	**3.1**	NM	**4**
READING ON UNIT	WELL FLOW (CFM)	NM	NM	NA	23	NA	26	NA	30	NA	31	NA	24	NA	29	NA
	RA/MA	NM	NM	NA	50/0	NA	50/0	NA	50/0	NA	50/0	NA	50/0	NA	50/0	NA
	CORRECTED FLOW (CFM)(2)	NM	NM	NA	11.5	NA	13	NA	15	NA	15.5	NA	12	NA	14.5	NA
	VACUUM (in.)	NM	NM	NA	-10	NA	-10	NA	-10	NA	-10	NA	-10	NA	-10	NA
FIELD PRESSURE MEASUREMENTS (inch)	DVW-1 (EXT. Well)	0.0	NM	NA	-7.0	NA	-7.0	NA	-7.0	NA	-7.0	NA	-7.0	NA	-7.0	NA
	DVP-1 (10')	0.0	-0.10	NA	-3.0	NA	-3.0	NA	-2.5	NA	-2.5	NA	-3.0	NA	-3.0	NA
	DMP-1 (20')	-0.1	-0.08	NA	-2.0	NA	-2.0	NA	-2.0	NA	-2.0	NA	-2.0	NA	-2.0	NA
	DMP-2 (40')	0.0	-0.06	NA	-1.0	NA	-1.0	NA	-1.0	NA	-1.0	NA	-1.2	NA	-1.5	NA
	DMP-3 (60')	0.0	-0.06	NA	-1.0	NA	-1.0	NA	-1.0	NA	-1.0	NA	-1.1	NA	-1.1	NA
	AIV-1	0.0	-0.08	NA	-1.5	NA	-1.2	NA	-1.2	NA	-1.2	NA	-1.8	NA	-1.8	NA
	AIV-2	0.0	-0.08	NA	-1.0	NA	-1.0	NA	-1.0	NA	-1.0	NA	-1.2	NA	-1.5	NA
	AIV-3	0.0	-0.08	NA	-2.0	NA	-1.5	NA	-1.2	NA	-1.2	NA	-1.5	NA	-1.5	NA
	AIV-4	0.0	-0.10	NA	-2.0	NA	-1.5	NA	-1.5	NA	-1.5	NA	-2.0	NA	-2.0	NA

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NM = NOT MEASURED   NA = NOT APPLICABLE   **BOLD NUMBERS** = CONCENTRATIONS ABOVE DETECTION LIMIT OR RECORDED FROM FIELD EQUIPMENT

(1) No constituents were detected above the reporting limit.

(2) Corrected wellhead flow calculated from total flow, adjusted for recycle and makeup air contribution.

TABLE 3.21

SUMMARY OF FIELD AND LABORATORY DATA FOR AREA 8 - DEEP ZONE SVE TEST REBOUND PERIOD
WASTE DISPOSAL, INC. SUPERFUND SITE

MONITORING LOCATION	DATE	9/21/98: 0930		9/22/98: 0900		9/23/98· 0730		9/24/98. 0930		9/28/98: 1000		10/2/98· 0645		10/6/98: 1020		11/9/98		11/23/98		12/17/98		1/20/99	
	PARAMETERS	FIELD	LAB	FIELD	LAB	FIELD	LAB	FIELD	LAB	FIELD	LAB	FIELD	LAB	FIELD	LAB	FIELD	LAB	FIELD	LAB	FIELD	LAB	FIELD	LAB
EXTRACTION WELL (DVW-1)	CH_4(%)	**0.0**	**0.149**	**0.0**	**0.0754**	**0.0**	**0.0459**	**0.0**	**0.0267**	**0.0**	**0.009**	**0.0**	**0.0036**	**0.0**	**0.0013**	**0.2**	NS	**0.048**	NS	**0.2**	NS	**0.11**	NS
	TNMO (ppm)	NM	**78**	NM	**113**	NM	**140**	NM	**187**	NM	**328**	NM	**361**	NM	**596**	NM	NS	NM	NS	NM	NS	NM	NS
	O_2(%)	**12.7**	**7.6**	**11.4**	**11.4**	**12.0**	**12.4**	**12.0**	**12.6**	**14**	**14.6**	**15**	**15.2**	**14.5**	**14.7**	**10**	NS	**13.1**	NS	**10.2**	NS	**9.6**	NS
	CO_2(%)	**7.6**	**13.2**	**8.7**	**9.4**	**8.0**	**8.4**	**7.8**	**7.9**	**5.5**	**5.6**	**4.4**	**4.8**	**4.8**	**5**	**5.1**	NS	**4.7**	NS	**5.9**	NS	**5.5**	NS
	Benzene (ppb)	NM	<11	NM	<11	NM	<11	NM	<12	NM	<11	NM	<11	NM	<12	NM	NS	NM	NS	NM	NS	NM	NS
	Vinyl Chloride (ppb)	NM	<11	NM	<11	NM	<11	NM	<12	NM	<11	NM	<11	NM	<12	NM	NS	NM	NS	NM	NS	NM	NS
	Total Organics (ppb)	NM	**1,373**	NM	**12,331**	NM	**20,435**	NM	**34,192**	NM	**37,795**	NM	**12,007**	NM	**68,543**	NM	NS	NM	NS	NM	NS	NM	NS
	TCE (ppb)	NM	<11	NM	<11	NM	<11	NM	<12	NM	**<11**	NM	<11	NM	<12	NM	NS	NM	NS	NM	NS	NM	NS
	PCE (ppb)	NM	**865**	NM	**1,480**	NM	**1,410**	NM	**1,310**	NM	**782**	NM	**594**	NM	**550**	NM	NS	NM	NS	NM	NS	NM	NS

94-256/TM#9A Rev 3 (2/26/99/mm)

NS = NO SAMPLE FOR LABORATORY ANALYSES WAS COLLECTED   NM = NOT MEASURED   NA = NOT APPLICABLE   **BOLD NUMBERS** = CONCENTRATIONS ABOVE DETECTION LIMIT OR RECORDED FROM FIELD EQUIPMENT

TABLE 3.22

RV STORAGE LOT
SVE START-UP AND OPERATIONAL PARAMETERS
WASTE DISPOSAL, INC. SUPERFUND SITE

PARAMETERS	SHALLOW WELL				
	SVW-1	SVP-1	SMP-1	SMP-2	SMP-3
	9/23/98; 0750	9/23/98; 0750	9/23/98; 0750	9/23/98; 0750	9/23/98; 0750
Wellhead Vacuum (Inches)	-6	-0.4	-0.31	-0.1	-0.1
Well Flow (Fpm)	260	- -	- -	- -	- -
Recycle Air (%)	20	- -	- -	- -	- -
Make Up Air (%)	70	- -	- -	- -	- -
Catalyst Temperatures (°C)					
• Inlet	718	- -	- -	- -	- -
• Center 1	735	- -	- -	- -	- -
• Center 2	724	- -	- -	- -	- -
• Outlet	730	- -	- -	- -	- -

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TABLE 3.23

SUMMARY OF FIELD AND LABORATORY DATA FOR RV - SHALLOW ZONE SVE TEST ACTIVE PHASE WASTE DISPOSAL, INC. SUPERFUND SITE

MONITORING LOCATION	DATE/TIME	(Initial) 9/22/98; 1400	9/23/98; 0750		9/23/98; 0915		9/23/98; 1115		9/23/98; 1315		9/23/98; 1515		9/24/98; 0830		9/24/98; 1530		9/25/98; 0830	
	PARAMETERS	FIELD	FIELD	LAB	FIELD	LAB	FIELD	LAB	FIELD	LAB	FIELD	LAB	FIELD	LAB	FIELD	LAB	FIELD	LAB
EXTRACTION WELL (SVW-1)	CH_4(%)	0.0	0.0	0.047	0.6	1.3	0.5	0.9	0.4	0.7	0.2	0.6	0.0	0.07	0.0	0.05	0.0	0.03
	TNMO (ppm)	NM	NM	149	NM	132	NM	75	NM	64	NM	52	NM	11	NM	12	NM	8
	O_2(%)	10.1	9.8	10.3	13.5	13.7	17.9	17.7	18.6	18.4	19.3	18.9	20.6	20.7	20.6	20.6	20.7	20.6
	CO_2(%)	4.6	4.5	4.7	2.9	3.2	1.2	1.4	0.9	1	0.6	0.8	0.0	0.15	0.0	0.11	0.0	0.09
	Benzene (ppb)	NM	NM	51.8	NM	40	NM	24.4	NM	26	NM	20.2	NM	2.6	NM	1.2	NM	1.9
	Vinyl Chloride (ppb)	NM	NM	5	NM	28	NM	23	NM	21.6	NM	18.1	NM	<1.4	NM	<0.8	NM	<0.7
	Total Organics (ppb)	NM	NM	755.6	NM	81	NM	80.6	NM	116	NM	64	NM	6	NM	26.6	NM	33
	TCE (ppb)	NM	NM	<2.8	NM	<11	NM	<0.8	NM	<1.7	NM	<1.5	NM	<1.4	NM	<0.8	NM	<0.7
	PCE (ppb)	NM	NM	<2.8	NM	<11	NM	1	NM	<1 7	NM	<1.5	NM	<1.4	NM	<0.8	NM	<0.7
POST BLOWER	CH_4(%)	NM	NM	NM	0.0	0.07	0.0	0.24	0.0	0.24	0.0	0.02	0.0	0.04	0.0	0.05	0.0	0.03
	TNMO (ppm)	NM	NM	NM	NM	14	NM	26	NM	22	NM	22	NM	7	NM	11	NM	7
	O_2(%)	NM	NM	NM	20.3	20.5	20.3	20.2	20.5	20.1	20.7	20.4	20.6	20.6	20.6	20.6	20.7	20.8
	CO_2(%)	NM	NM	NM	0.1	0.19	0.3	0.3	0.2	0.2	0.2	0.2	0.0	0.11	0.0	0.11	0.0	0.09
	Benzene (ppb)	NM	NM	NM	NM	3.2	NM	7.2	NM	6.1	NM	5.6	NM	2	NM	1.2	NM	2
	Vinyl Chloride (ppb)	NM	NM	NM	NM	<2.7	NM	6.5	NM	5.3	NM	5.6	NM	<1.4	NM	<0.7	NM	<0.7
	Total Organics (ppb)	NM	NM	NM	NM	3.2	NM	17.6	NM	16.6	NM	14.9	NM	12.6	NM	26.3	NM	24.4
	TCE (ppb)	NM	NM	NM	NM	<2.7	NM	<1.4	NM	<1 5	NM	<1 5	NM	<1.4	NM	<0.7	NM	<0.7
	PCE (ppb)	NM	NM	NM	NM	<2.7	NM	<1.4	NM	<1.5	NM	<1.5	NM	<1.4	NM	<0.7	NM	0.8
STACK	CH_4(%)	NM	NM	NM	0.0	0.02	0.0	0.02	0.0	0.03	0.0	0.03	0.0	0.03	0.0	0.05	0.0	0.03
	TNMO (ppm)	NM	NM	NM	NM	<2	NM	9	NM	6	NM	10	NM	<2	NM	<2	NM	<2
	O_2(%)	NM	NM	NM	20.3	20.2	19.7	19.6	20.1	19.9	20.3	20	20.6	20.6	20.6	20.8	20.7	20.6
	CO_2(%)	NM	NM	NM	0.2	0.24	0.5	0.05	0.4	0.4	0.4	0.4	0.0	0.12	0.0	0.12	0.0	0.09
	Benzene (ppb)	NM	NM	NM	NM	<0.7	NM	<1.4	NM	<0.7	NM	<0.7	NM	<0.8	NM	<0.7	NM	<0.7
	Vinyl Chloride (ppb)	NM	NM	NM	NM	<0.7	NM	<1.4	NM	<0.7	NM	<0.7	NM	<0.8	NM	<0.7	NM	<0.7
	Total Organics (ppb)	NM	NM	NM	NM	79.1	NM	91.7	NM	38.4	NM	35.2	NM	301	NM	17.5	NM	59.3
	TCE (ppb)	NM	NM	NM	NM	<0.7	NM	<1.4	NM	<0.7	NM	<0.7	NM	<0.8	NM	<0.7	NM	<0.7
	PCE (ppb)	NM	NM	NM	NM	<0.7	NM	<1.4	NM	<0.7	NM	<0.7	NM	<0.8	NM	<0.7	NM	<0.7
READING ON UNIT	WELL FLOW (CFM)	NM	NM	NA	5	NA	4	NA	7	NA	10	NA	17	NA	39	NA	39	NA
	RA/MA	NM	NM	NA	20/30	NA	30/50	NA	30/50	NA	30/50	NA	30/50	NA	0/15	NA	0/15	NA
	CORRECTED FLOW (CFM)	NM	NM	NA	2.5	NA	1.8	NA	2.0	NA	2.2	NA	3.4	NA	6	NA	6	NA
	VACUUM (in.)	NM	NM	NA	-6	NA	-14	NA	-13	NA	-13	NA	-7	NA	-10	NA	-8	NA
FIELD PRESSURE MEASUREMENTS (inch)	SVW-1 (EXT. Well)	0.0	NM	NA	-4.8	NA	-14	NA	-13	NA	-13	NA	-5.5	NA	-7.0	NA	-5.5	NA
	SVP-1 (5')	0.0	NM	NA	-0.4	NA	-1.0	NA	-1.3	NA	-1.4	NA	-0.4	NA	-0.51	NA	-0.31	NA
	SMP-1 (10')	-0.1	NM	NA	-0.31	NA	-0.8	NA	-0.8	NA	-0.8	NA	-0.2	NA	-0.32	NA	-0.18	NA
	SMP-2 (20')	0.0	NM	NA	-0.1	NA	-0.2	NA	-0.1	NA	-0.1	NA	-0.04	NA	-0.10	NA	-0.06	NA
	SMP-3 (30')	0.1	NM	NA	-0.1	NA	-0.4	NA	-0.4	NA	-0.4	NA	-0.2	NA	-0.2	NA	-0.08	NA
	AIV-1	0.0	NM	NA	NM	NA	NM	NA	NM	NA	NM	NA	NM	NA	NM	NA	NM	NA
	AIV-2	0.0	NM	NA	NM	NA	NM	NA	NM	NA	NM	NA	NM	NA	NM	NA	NM	NA
	AIV-3	0.0	NM	NA	NM	NA	NM	NA	NM	NA	NM	NA	NM	NA	NM	NA	NM	NA
	AIV-4	0.0	NM	NA	NM	NA	NM	NA	NM	NA	NM	NA	NM	NA	NM	NA	NM	NA

94-256/TM#9A Rev 3 (2/26/99/mm)

NM = NOT MEASURED NA = NOT APPLICABLE **BOLD NUMBERS** = CONCENTRATIONS ABOVE DETECTION LIMIT OR RECORDED FROM FIELD EQUIPMENT

(1) Corrected wellhead flow calculated from total flow, adjusted for recycle and makeup air contribution.

TABLE 3.24

SUMMARY OF FIELD AND LABORATORY DATA FOR RV - SHALLOW ZONE SVE TEST REBOUND PERIOD
WASTE DISPOSAL, INC. SUPERFUND SITE

MONITORING LOCATION	DATE	9/28/98. 0900		9/29/98: 0830		9/30/98: 0900		10/1/98: 0800		10/6/98. 1045		11/9/98		11/23/98		12/17/98		1/20/99	
	PARAMETERS	FIELD	LAB	FIELD	LAB	FIELD	LAB	FIELD	LAB	FIELD	LAB	FIELD	LAB	FIELD	LAB	FIELD	LAB	FIELD	LAB
EXTRACTION WELL (DVW-1)	CH_4(%)	**0.0**	**0.0065**	**0.0**	**0.166**	**0.0**	**0.14**	**0.0**	**0.129**	**0.0**	**0.685**	**0.0**	NS	**0.0**	NS	**0.0**	NS	**0.0**	NS
	TNMO (ppm)	NM	**42**	NM	**127**	NM	**121**	NM	**128**	NM	**102**	NM	NS	NM	NS	NM	NS	NM	NS
	O_2(%)	**20.4**	**20.4**	**14.5**	**14.4**	**19**	**14.8**	**14.9**	**14.5**	**14**	**14.6**	**13.4**	NS	**14.4**	NS	**12.3**	NS	**11.4**	NS
	CO_2(%)	**0.1**	**0.198**	**1.4**	**1.5**	**0.5**	**2**	**2.0**	**2.3**	**2.9**	**3**	**1.9**	NS	**2.2**	NS	**2.7**	NS	**2.2**	NS
	Benzene (ppb)	NM	**12.1**	NM	**63.2**	NM	**63.1**	NM	**67.8**	NM	**39.1**	NM	NS	NM	NS	NM	NS	NM	NS
	Vinyl Chloride (ppb)	NM	<1 4	NM	**7.1**	NM	**5.7**	NM	**6.7**	NM	**3**	NM	NS	NM	NS	NM	NS	NM	NS
	Total Organics (ppb)	NM	**243.5**	NM	**699.9**	NM	**925**	NM	**725.2**	NM	**2,073.9**	NM	NS	NM	NS	NM	NS	NM	NS
	TCE (ppb)	NM	<1 4	NM	**3.8**	NM	**4.2**	NM	<3.1	NM	<1.5	NM	NS	NM	NS	NM	NS	NM	NS
	PCE (ppb)	NM	<1.4	NM	<2.7	NM	<3.0	NM	<3.1	NM	<1.5	NM	NS	NM	NS	NM	NS	NM	NS

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NS = NO SAMPLE FOR LABORATORY ANALYSES WAS COLLECTED NM = NOT MEASURED NA = NOT APPLICABLE **BOLD NUMBERS** = CONCENTRATIONS ABOVE DETECTION LIMIT OR RECORDED FROM FIELD EQUIPMENT

TABLE 4.1

SUMMARY OF ZONE OF INFLUENCE BY SITE AREA
WASTE DISPOSAL, INC. SUPERFUND SITE

AREA	ESTIMATED ZONE OF INFLUENCE RADIUS (feet)
Brothers (Area 5)	
• Shallow	37
• Deep	176
C&E Die	
• Shallow	(1)
• Deep	> 200
Area 7	
• Shallow	37
• Deep	> 200
Area 8	
• Shallow	32
• Deep	122
RV Storage Lot (Area 2)	
• Shallow	24

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(1) Data was inconsistent, and could not be evaluated. However, a zone of influence of approximately 30 feet was observed in the field based on the vacuum level observed in SMP-2 (20 feet) and SMP-3 (30 feet).

TABLE 4.2

GASSOLVE INPUT PARAMETERS
WASTE DISPOSAL, INC. SUPERFUND SITE

PARAMETER DESCRIPTION	INPUT VALUE
Formation Type	Open (shallow) Leaky (deep)
Time Dependency	Steady
Volumetric Flow Rate	SVE Data (cfm)
Local Atmospheric Pressure	1.0 Standard Atmospheres[1]
Gas Viscosity	0.18×10^{-4} Pascals-seconds[1]
Volumetric Gas Content	0.200[1]
Formation Thickness	From SVE Data/Logs
Depth to Top of SVE Extraction Well	From SVE Data/Logs
Depth to Bottom of SVE Extraction Well	From SVE Data/Logs

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(1) Default.

TABLE 4.3

SUMMARY OF GASSOLVE MODELING RESULTS
WASTE DISPOSAL, INC. SUPERFUND SITE

AREA	AVERAGE			
	Horizontal Permeability (meters^2)	Leakage (meters^2)	Sum of Square	Average Error (%)
Brothers (Area 5)				
• Shallow Soils	1.87×10^{-8}	3.82×10^{-11}	8.94×10^{-8}	33.64
• Deep Soils	8.99×10^{-11}	2.58×10^{-13}	8.65×10^{-7}	3.099
C&E Die				
• Shallow Soils	6.69×10^{-11}	1.47×10^{-10}	2.31×10^{-8}	0.368
• Deep Soils	3.67×10^{-11}	1.32×10^{-14}	5.12×10^{-6}	1.907
Area 7				
• Shallow Soils	6.27×10^{-12}	2.79×10^{-12}	2.77×10^{-7}	0.924
• Deep Soils	5.4×10^{-10}	5.86×10^{-14}	3.9×10^{-7}	4.008
Area 8				
• Shallow Soils	1.34×10^{-10}	2.52×10^{-11}	7.52×10^{-8}	1.719
• Deep Soils	3.62×10^{-11}	1.19×10^{-13}	1.02×10^{-6}	2.726
RV Storage Lot (Area 2)				
• Shallow Soils	6.72×10^{-11}	1.78×10^{-11}	1.71×10^{-6}	3.013

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TABLE 4.4

COMPARISON Of SOIL TYPE FROM BORING LOGS AND SOIL TYPE DETERMINED FROM HORIZONTAL PERMEABILITY WASTE DISPOSAL, INC. SUPERFUND SITE

AREA	SOIL TYPE ALONG WELL SCREEN INTERVAL (Boring Log Observations)	HORIZONTAL PERMEABILITY (meters^2) FROM GASSOLVE MODELING PROGRAM	SOIL TYPE FROM PERMEABILITY(1)
Area 7-deep	Silty sand (medium to fine)	5.40E-10	Silty sand to clean sand
Area 7-shallow	Silty sand (medium to fine) and sump material at 4.5 ft.	6.27E-12	Silty sand to clean sand
Area 8-deep	Silty sand to clayey sand, and sand (medium to coarse)	3.62E-11	Silty sand to clean sand
Area 8-shallow	Silty sand (medium to fine) and sandy clay	1.34E-10	Silty sand to clean sand
Brothers (Area 5)-deep	Silty sand to sand (medium to fine, and well graded)	8.99E-11	Silty sand to clean sand
Brothers (Area 5) - shallow	Sandy silt to sandy clay (medium to fine sand)	1.87E-08	Silty sand and clean sand
C&E Die - deep	Sandy silt to silty sand (medium to fine), sand (medium to fine, well graded)	3.67E-11	Silty sand to clean sand
C&E Die - shallow	Sandy silt to sandy clay (medium to fine sand)	6.69E-11	Silty sand to clean sand
RV Storage Lot - shallow	Sandy clay	6.72E-11	Silty sand to clean sand

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(1) Data from Soil Vapor Extraction Technology, Petersens, T.A., 1991. Noyes Data Corporation, New Jersey.

TRC

TABLE 4.5

COMPARISON OF SOIL GAS LEVELS
WASTE DISPOSAL, INC. SUPERFUND SITE

AREA	INITIAL PURGED CONCENTRATIONS			SVE SHUTDOWN CONCENTRATIONS			FINAL SOIL GAS RECOVERY MONITORING		
	CH_4 (%)	CO_2 (%)	O_2 (%)	CH_4 (%)	CO_2 (%)	O_2 (%)	CH_4 (%)	CO_2 (%)	O_2 (%)
Brothers (Area 5)									
• Shallow	0.2	2.7	9.3	0.0	4.9	11.6	0.0	9.2	2.3
• Deep	3.0	7.0	7.9	1.3	11.8	3.4	1.6	14.7	0.0
C&E Die									
• Shallow	0.2	5.7	13.2	0.0	0.4	20.2	0.0	7.7	3.6
• Deep	2.7	4.5	13.3	0.5	13.7	6.3	0.0	19.8	0.6
Area 7									
• Shallow	0.4	10.0	0.0	0.0	6.0	8.4	0.1	7.3	0.0
• Deep	0.0	0.0	20.9	0.0	8.5	13.0	0.6	13.7	0.0
Area 8									
• Shallow	0.1	14.4	3.6	0.0	1.1	19.3	0.0	10.1	0.0
• Deep	0.0	0.4	20.5	0.0	12.5	7.4	0.11	5.5	9.6
RV Storage Lot (Area 2)									
• Shallow	0.0	4.6	10.1	0.0	0.0	20.7	0.0	2.2	11.4

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TABLE 4.6

ESTIMATE OF MASS REMOVAL OF METHANE, BENZENE, AND VINYL CHLORIDE DURING SVE TESTING WASTE DISPOSAL, INC. SUPERFUND SITE

AREA	CONSTITUENT	AMOUNT REMOVED (lbs)
Area 7 Shallow	Methane	4.213
	Benzene	4.58E-05
	Vinyl Chloride	0
Area 7 Deep	Methane	62.591
	Benzene	9.90E-05
	Vinyl Chloride	0.0002
Area 8 Shallow	Methane	0.051
	Benzene	0
	Vinyl Chloride	0
Area 8 Deep	Methane	0.178
	Benzene	0
	Vinyl Chloride	0
Brothers (Area 5) Shallow	Methane	0.145
	Benzene	0
	Vinyl Chloride	0
Brothers (Area 5) Deep	Methane	977.35
	Benzene	0.0197
	Vinyl Chloride	0.0128
C&E Die Shallow	Methane	0.832
	Benzene	0.00007
	Vinyl Chloride	0.00002
C&E Die Deep	Methane	326.09
	Benzene	0.0148
	Vinyl Chloride	0.0082
RV Storage Lot (Area 2) Shallow	Methane	2.204
	Benzene	0.000043
	Vinyl Chloride	0.00001

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See Appendix ___ for tables showing calculations for each area.

Theory:

- Determined the volume of gas by using the total volume removed during the test and the concentration of the gas.
- Total volume removed was calculated using the well flow rate and duration of the test.
- Used the Ideal gas law to determine the mass of the gas knowing the volume, pressure, temperature, and molar mass.
- Molar mass of methane = 16 g/mole.
- Molar mass of benzene = 78 g/mole.
- Molar mass of vinyl chloride = 62.5 g/mole

Assumptions:

- Pressure = 1 atm and the pressure remained constant for the duration of the SVE test.
- Flow rate remained constant for the duration of the SVE test.
- Gas concentration as determined by the laboratory remained constant for the duration of the SVE test.
- Temperature remained constant for duration of SVE test. If temperature was not recorded on day of test, other records were checked to see if it had been recorded for another area. If not recorded at all, used temperature from previous day or a subsequent day at similar time for the test.

TABLE 5.1

SUMMARY OF SVE DATA EVALUATION
WASTE DISPOSAL, INC. SUPERFUND SITE

PARAMETER	RESULTS
Zone of Influence	• Shallow soils zones of influence ranged from 20 to >30 feet. • Deep soils zones of affluence ranged from 122 to 200 feet.
Air Conductivity	• Air permeability indicated low to moderate permeable soils: - Shallow soils ranged from 10^{-8} to 10^{-11} cm^2. - Deep soils ranged from 10^{-10} to 10^{-12} cm^2.
Soil Gas Recovery	• Shallow soils: - Shallow soils demonstrated very low CH_4 levels. - O_2 levels decreased during the rebound monitoring, indicative of biodegradation. • Deep soils: - CH_4 levels increased slightly. - O_2 levels decreased in all areas except Area 8, which increased. - CO_2 levels increased in all areas except Area 8, which is consistent with aerobic biodegradation.
Gas Generation Rates	• Soil gas rebound data demonstrated low gas generation rates, consistent with the February 1998 site hypothesis and gas generation calculations.
SVE Performance Characteristics • Wellhead Flow	• Corrected wellhead flows ranged from 2 to 80 scfm: - Shallow soils produced lower wellhead flow rates due to lower permeability and vertical leakage. - Deeper soils presented higher flow rates and greater zones of influence, due to higher permeability and lower vertical leakage.
• Soil Gas Recovery Levels	• Shallow soils gas recovery levels ranged from 0 to 900 lbs.
• Soil Gas Treatment Destruction Efficiency	• Treatment efficiency ranged from 0 to 60 percent.

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TABLE 5.2

PRELIMINARY SCREENING OF ALTERNATIVES FOR SOIL GAS WASTE DISPOSAL, INC. SUPERFUND SITE

ALTERNATIVE	EFFECTIVENESS	IMPLEMENTABILITY	COST	STATUS
SG-1 No Action	May be sufficiently effective, since the majority of vapor well data is below IAL and CIWMB requirements. Further, SVE pilot testing may have reduced the soil gas levels in some areas with exceedances.	Implementable	Low	Retained
SG-2 Site-wide Passive Gas Collection	Effective as part of hazardous waste landfill covers and reducing potential soil gas emissions.	Implementable as part of Reservoir Cap Design; however, outside the reservoir area implementation may be difficult due to proximity of onsite businesses and access areas.	Moderate	--
SG-2.1 Reservoir Area Passive Gas Collection	Gas control using passive collection systems as part of hazardous waste landfill covers has been shown to be effective.	Implementable as part of Reservoir Cap Design.	Moderate	Retained
SG-2.2 Passive Gas Collection Outside Reservoir	Gas control using passive collection systems outside the reservoir may be effective in reducing potential soil gas emissions.	Implementation outside the reservoir area may be difficult due to the proximity of onsite businesses and access areas.	Moderate	Retained
SG-3 Monitoring (Outside Reservoir)	Monitoring would not be considered effective, since it would not reduce the toxicity, mobility or volume (TMV) or control current or future exposure. However, gas monitoring may be required as part of the overall remedy at the site.	Implementable	Low to Moderate	Retained
SG-4 Institutional Controls (Outside Reservoir)	Existing regulations and proposed institutional control (deed restrictions) will reduce the potential for soil gas exposure.	Implementable. However, may not be sufficiently protective alone.	Low	Retained

TABLE 5.2

PRELIMINARY SCREENING OF ALTERNATIVES FOR SOIL GAS WASTE DISPOSAL , INC. SUPERFUND SITE
(Continued)

ALTERNATIVE	EFFECTIVENESS	IMPLEMENTABILITY	COST	STATUS
SG-5 Reservoir Capping with Surficial Active Gas Control and Treatment	Effective in controlling some gas conditions. However, increased effectiveness compared to SG-2 may not be significant.	Implementable	Moderate	Retained
SG-6 Soil Vapor Extraction (Outside Reservoir)	SVE Treatability Studies have shown SVE to be effective in reducing methane and VOC levels in the subsurface.	Implementable, as shown by treatability studies.	Moderate	Retained
SG-7 Bioventing (Outside Reservoir)	SVE Treatability Studies have shown the potential for bioventing (passive or active) to be effective.	Implementable (similar to SVE)	Low to Moderate	Retained
SG-8 Gas Venting System Beneath New Structures	Effective in controlling emissions to buildings.	Implementable. Required by existing building codes.	NA	Retained

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NA = Cost would be paid by developer.

TABLE 5.3

SUMMARY - REMEDIAL ALTERNATIVES EVALUATED AND PRELIMINARY SCREENING RESULTS WASTE DISPOSAL, INC. SUPERFUND SITE

MEDIA	REMEDIAL ALTERNATIVES	SITE AREA TO WHICH ALTERNATIVES APPLY[1]									
		Area 1	Reservoir	Area 2[2]	Area 3	Area 4	Area 5	Area 6	Area 7	Area 8	Selected Hot Spots
Ground Water	• GW-1 No Action	●	●	●	●	●	●	●	●	●	
	• GW-2 Institutional Controls	●	●	●	●	●	●	●	●	●	
	• GW-3 Monitoring	●	●	●	●	●	●	●	●	●	
Soils	• S-1 No Action	●	●	●		●	●		●	●	
	• S-2 Capping of the Site										
	- S-2.1 RCRA-Equivalent Capping Over Reservoir		●								
	- S-2.2 RCRA-Equivalent Capping Outside Reservoir	●		●		●	●		●	●	
	- S-2.3 RCRA-Equivalent Capping of Site	○	○	○		○	○		○	○	
	- S-2.4 Monofill Capping of Site	●	●	●		●	●		●	●	
	- S-2.5 Monofill Capping Outside Reservoir	●		●		●	●		●	●	
	• S-3 Institutional Controls	●		●		●	●		●	●	
	• S-4 Excavation of Areas 4 and 7 Sump Materials and Hot Spots with Onsite Redisposal					●			●		●
	• S-5 Excavation and Treatment of Soils with Onsite Disposal	○	○	○		○	○		○	○	○
	• S-6 Excavation and Treatment of Soils with Onsite Disposal	○	○	○		○	○		○	○	○
	• S-7 Excavation of Sump Materials Adjacent to Area 8 Building									●	
Soil Gas	• SG-1 No Action[3]	●	●	●		●	●		●	●	
	• SG-2 Site-wide Passive Gas Collection										
	- SG-2.1 Reservoir Area Passive Gas Collection		●								
	- SG-2.2 Passive Gas Collection Outside Reservoir	●		●		●	●		●	●	
	• SG-3 Monitoring (Outside Reservoir)	●		●		●	●		●	●	
	• SG-4 Institutional Controls (Outside Reservoir)	●		●		●	●		●	●	
	• SG-5 Reservoir Capping with Surficial Active Gas Control and Treatment		●								
	• SG-6 Soil Vapor Extraction (Outside Reservoir)										●
	• SG-7 Bioventing (Outside Reservoir)	●		●		●	●		●	●	
	• SG-8 Gas Venting Beneath New Structures	●		●	●	●	●	●	●	●	
Liquids/ Leachate	Reservoir Area										
	• LL-1R No Action		●								
	• LL-2R Institutional Controls		●								
	• LL-3R Extraction		●								
	Other Site Areas (Non-Reservoir)										
	• LL-1.NR No Action			●		●	●		●		
	• LL-2.NR Institutional Controls			●		●	●		●		
	• LL-3.NR Infiltration Control			●		●	●		●		

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(1) Please see Figure __ for site area locations.
(2) This designation is Area 2, not including the reservoir footprint.
(3) The No Action alternative applies to the reservoir and other impacted areas.

LEGEND

● = Retained for detailed analysis.
○ = Not retained for detailed analysis.

TABLE 5.4

SOIL GAS CONTROL TECHNOLOGY EVALUATION SUMMARY
WASTE DISPOSAL, INC. SUPERFUND SITE

FEASIBILITY EVALUATION CRITERIA	SOIL VAPOR EXTRACTION (SG-6) OUTSIDE RESERVOIR	PASSIVE BIOVENTING (SG-7) OUTSIDE RESERVOIR
Overall Protectiveness of Human Health and the Environment	SVE has been shown to be protective of human health and the environment by reducing soil gas levels in the selected treatability areas outside the reservoir.	Based on the soil gas data collected during TM No. 9A activities the use of a passive bioventing system would be protective of human health and the environment, by reducing soil gas levels in areas outside the reservoir area.
Compliance with ARARs	SVE may be used to comply with the known ARARs for soil gas at the WDI site, including the CIWMB methane standards and EPA's Interim Action Levels/Interim Threshold Screening Levels.	The use of a passive bioventing system may be used to comply with the potential soil gas ARARs as discussed under SVE.
Long-Term Effectiveness and Performance	SVE is effective and permanent in reducing the site soil gas levels since the mass of contaminants extracted are destroyed.	Passive bioventing would likely be effective in permanently reducing the site soil gas levels on a long-term basis. During SVE recovery monitoring, aerobic degradation appears to have occurred while oxygen was present. Passive bioventing would introduce oxygen to the soils, to allow aerobic degradation to occur, reducing methane and hydrocarbon levels.
Reduction in Toxicity Volume or Mobility	SVE has been shown to be effective in reducing the toxicity and volume of soil gas constituents during the TM No. 9A treatability study, as discussed in Section 4. The mobility of the soil constituents is reduced during the active treatment phase based on the TM No. 9A zone of influence results. However, since the mass of soil contamination is reduced, this criteria is satisfied by SVE.	Passive bioventing would be expected to be as effective as SVE in reducing the toxicity, volume of the soil gas constituents. Although in different time process, as indicated under long-term effectiveness, passive bioventing would reduce the contaminant mass by encouraging biological degradations of the petroleum hydrocarbons and soil gases. Biodegradation will reduce the petroleum hydrocarbons to less toxic breakdown products and carbon dioxide. The TM No. 9A results indicate that biological degradation can occur when oxygen is introduced to the subsurface soils.

( ) = Acceptance by the State and Community were not addressed; however, it is expected that the alternative would be acceptable.

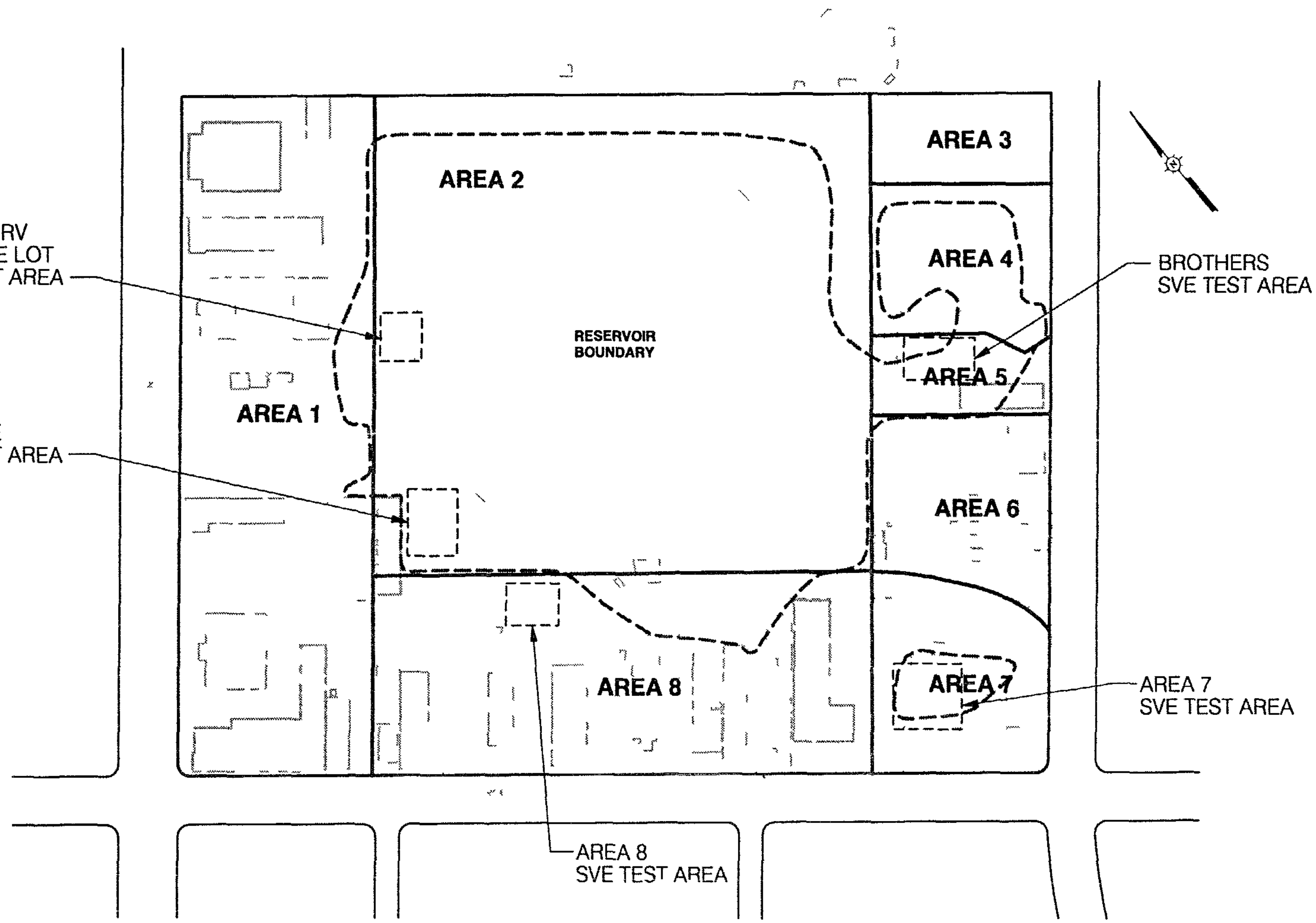
TABLE 5.4

SOIL GAS CONTROL TECHNOLOGY EVALUATION SUMMARY
WASTE DISPOSAL, INC. SUPERFUND SITE
(Continued)

FEASIBILITY EVALUATION CRITERIA	SOIL VAPOR EXTRACTION (SG-6) OUTSIDE RESERVOIR	PASSIVE BIOVENTING (SG-7) OUTSIDE RESERVOIR
Short-Term Effectiveness	The short-term effectiveness of SVE has been demonstrated during TM No. 9A. The SVE system and associated piping and utilities can be installed and operated without significantly increasing the short-term risk to the community or onsite workers.	The TM No. 9A activities have shown that technologies such as SVE or passive bioventing can be implemented without increasing the short-term risks. During TM No. 9A, wells and SVE equipment were operated adjacent to onsite structures, without adverse risk to onsite workers or the community.
Implementability	TM No. 9A has shown that SVE is implementable in areas outside the reservoir area, and in areas adjacent to onsite structures and businesses.	Although not addressed during TM No. 9A, passive bioventing appears to be implementable at the WDI site, based on the results of the SVE testing. During TM No. 9A, no significant SVE implementability issues were identified. The implementability of passive bioventing will be addressed as part of the FS.
Cost	SVE was selected for treatability testing since it has been shown to generally be cost effective at other waste sites. TM No. 9A activities did not address the cost effectiveness of SVE. However, the TM No. 9A data can be used to develop the necessary cost estimates to support the FS decision making process.	TM No. 9A did not address the cost effectiveness of passive bioventing. However, current information on passive bioventing ( ) indicates that it can be significantly more cost effective than SVE, due to lower initial capital cost and lower operating costs and reduced long (?). Some of the cost effectiveness may be offset by the need for longer-term monitoring activities. The cost effectiveness of passive bioventing will be addressed as part of the FS.

( ) = Acceptance by the State and Community were not addressed; however, it is expected that the alternative would be acceptable.

Figures



LEGEND

SITE BOUNDARY
SITE AREA BOUNDARY
FENCE
EXISTING BUILDING/STRUCTURE
PROPERTY BOUNDARY
SVE TEST AREA
SUMP-LIKE MATERIAL DELINIATION

0 300 600 FEET
SCALE

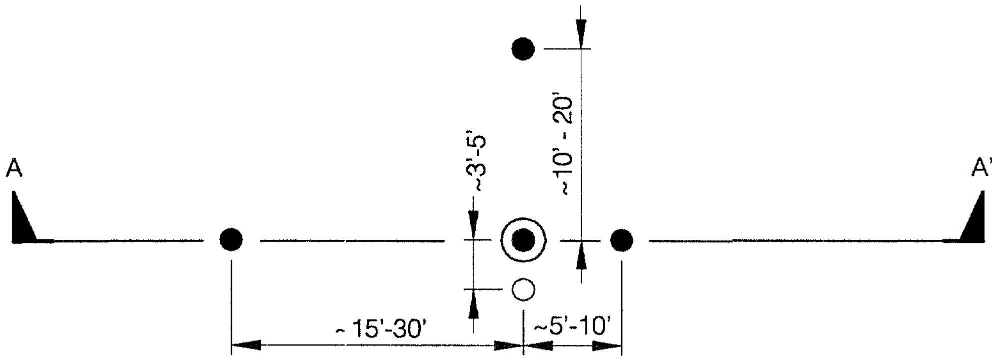
SVE TEST AREAS

WASTE DISPOSAL, INC
SANTA FE SPRINGS, CALIFORNIA

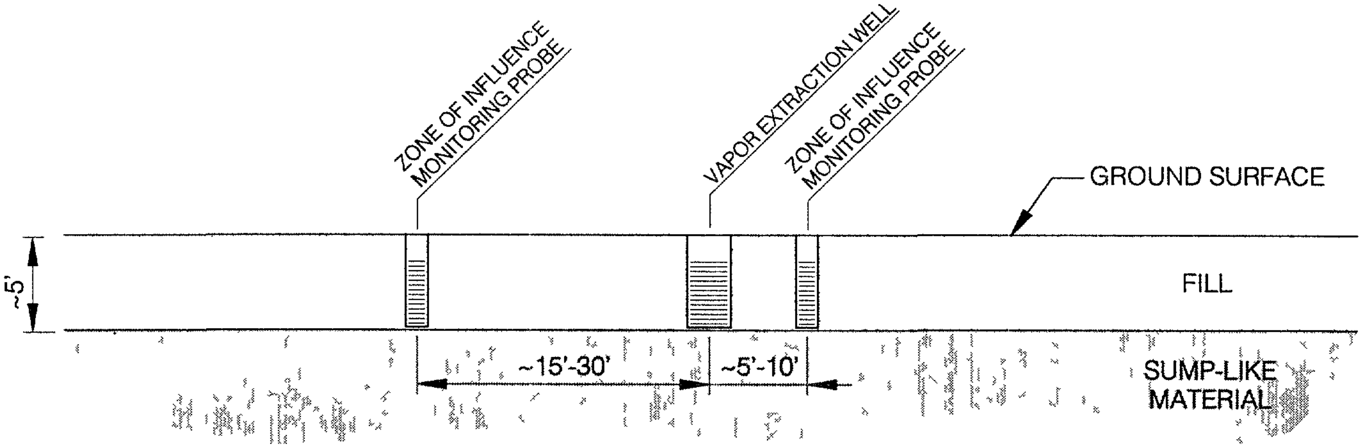
TRC

FIGURE 2.1

94 256TM9AROF 48 REV 02/23/99



PLAN VIEW



CROSS SECTION A-A'

NOT TO SCALE

LEGEND

◉ VAPOR EXTRACTION WELL

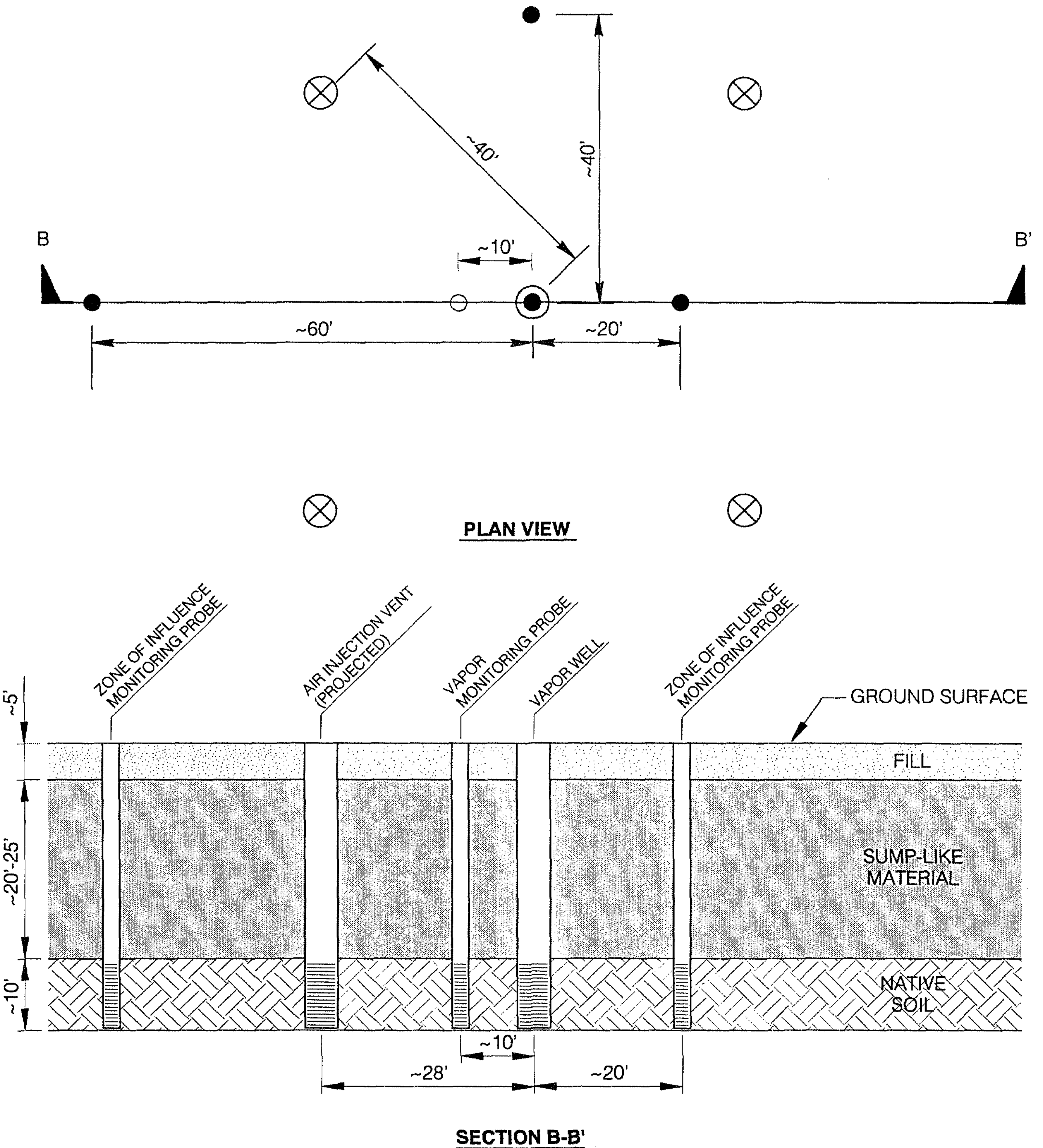
● ZONE OF INFLUENCE MONITORING PROBE (FOR MEASURING VACUUM)

○ VAPOR MONITORING PROBE (FOR SAMPLING GAS COMPOSITION)

EXAMPLE SVE TEST WELL CONFIGURATION IN FILL LAYER ABOVE THE SUMP-LIKE MATERIAL LAYER

WASTE DISPOSAL, INC
SANTA FE SPRINGS, CALIFORNIA

TRC | **FIGURE 2.2**



LEGEND

- VAPOR WELL
- AIR INJECTION VENT
- ZONE OF INFLUENCE MONITORING PROBE (FOR MEASURING VACUUM)
- VAPOR MONITORING PROBE (FOR SAMPLING GAS COMPOSITION)

NOT TO SCALE

EXAMPLE SVE TEST WELL CONFIGURATION IN THE NATIVE SOIL BENEATH THE SUMP-LIKE MATERIAL LAYER

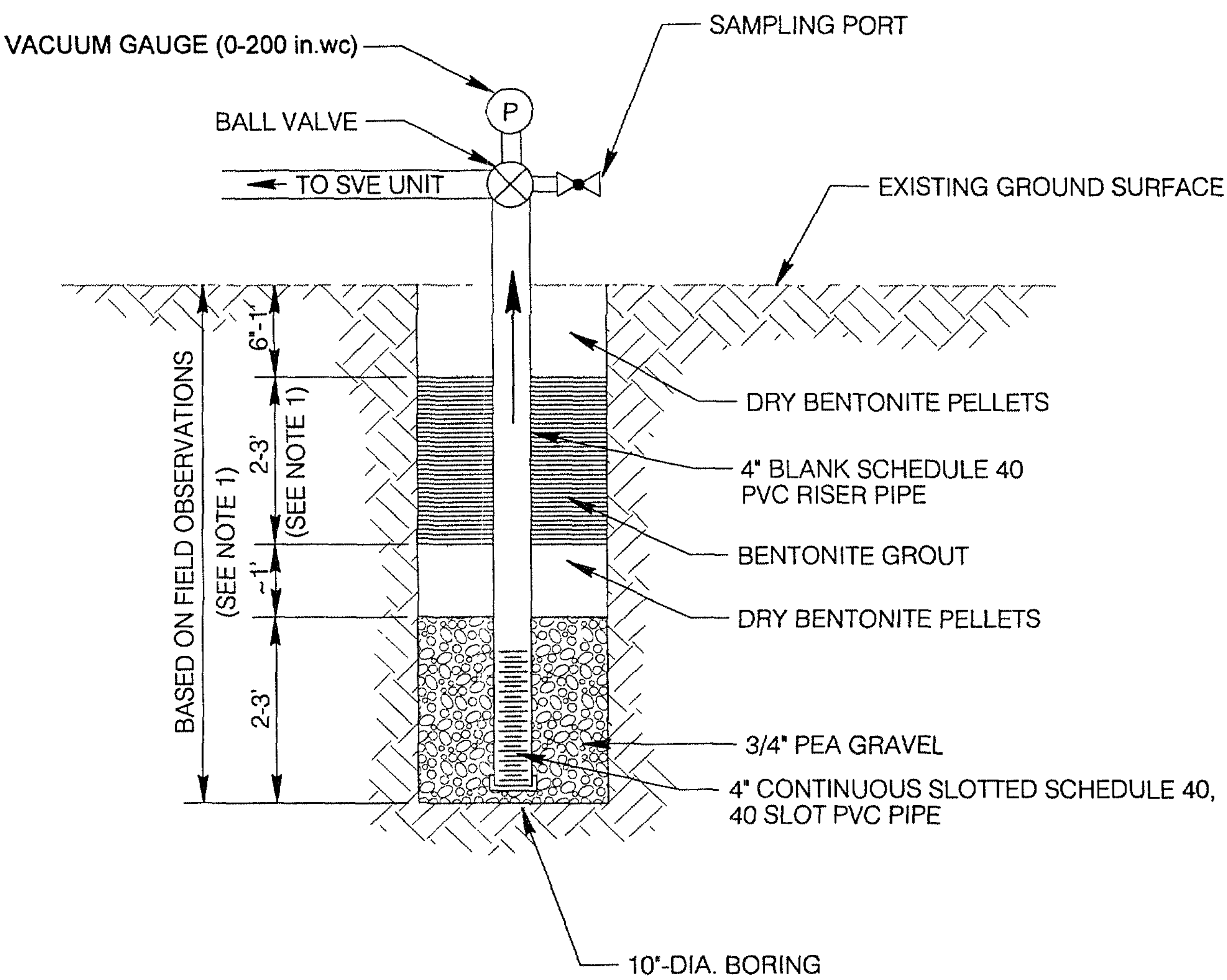
WASTE DISPOSAL, INC.
SANTA FE SPRINGS, CALIFORNIA

TRC

FIGURE 2.3

94-256TM9AROF-49 REV.02/23/99

94-256TM9AROF-50 REV 02/23/99



NOT TO SCALE

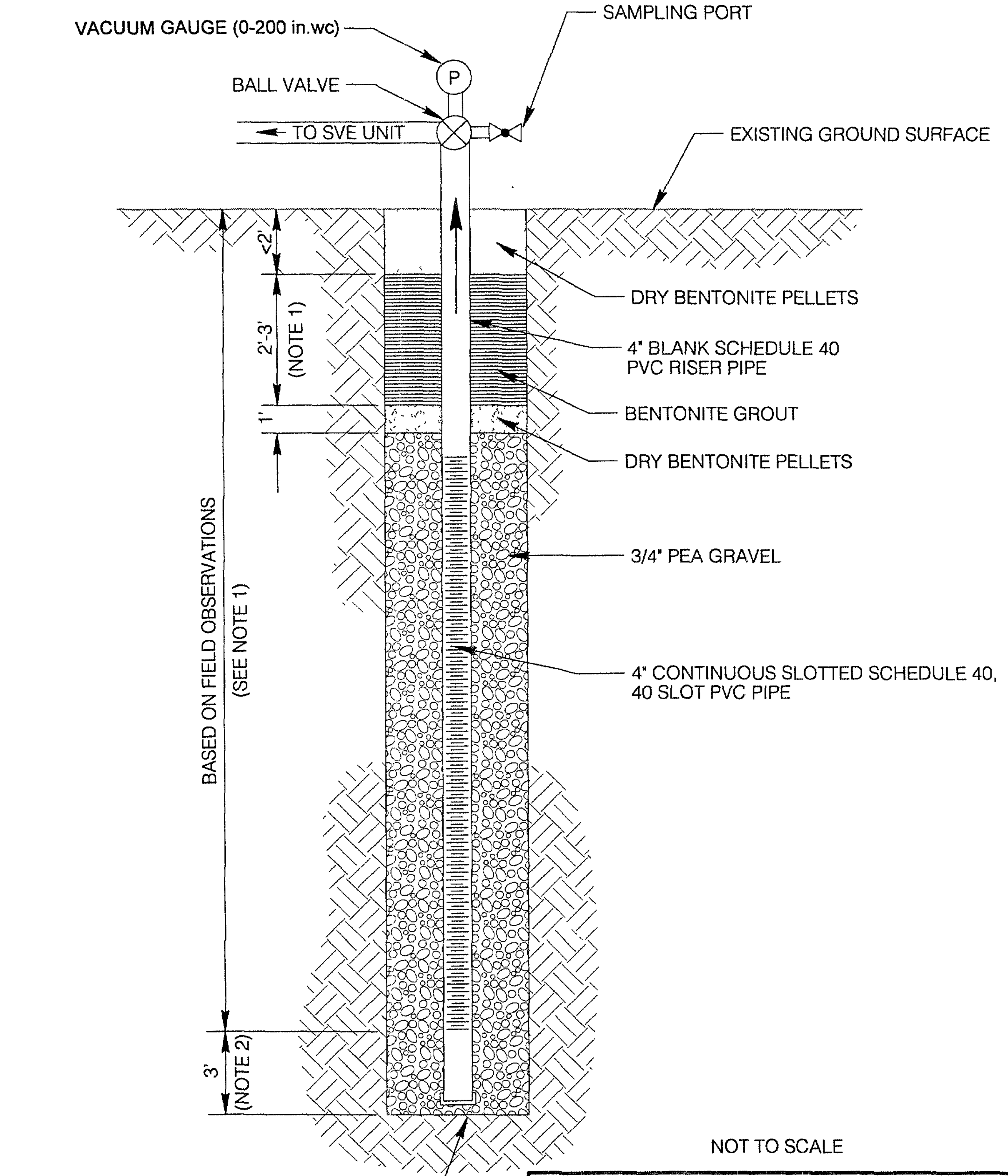
(1) THE DEPTH OF THIS SEAL AND SCREENED INTERVAL WAS DETERMINED ON A WELL BY WELL BASIS BASED ON ENCOUNTERED LITHOLOGY.

SCHEMATIC OF TYPICAL SVE TEST WELL CONSTRUCTION SHALLOW SOILS

WASTE DISPOSAL, INC.
SANTA FE SPRINGS, CALIFORNIA

TRC | FIGURE 2.4A

94-256TM9AROF-51 REV 02/23/99



NOTES:

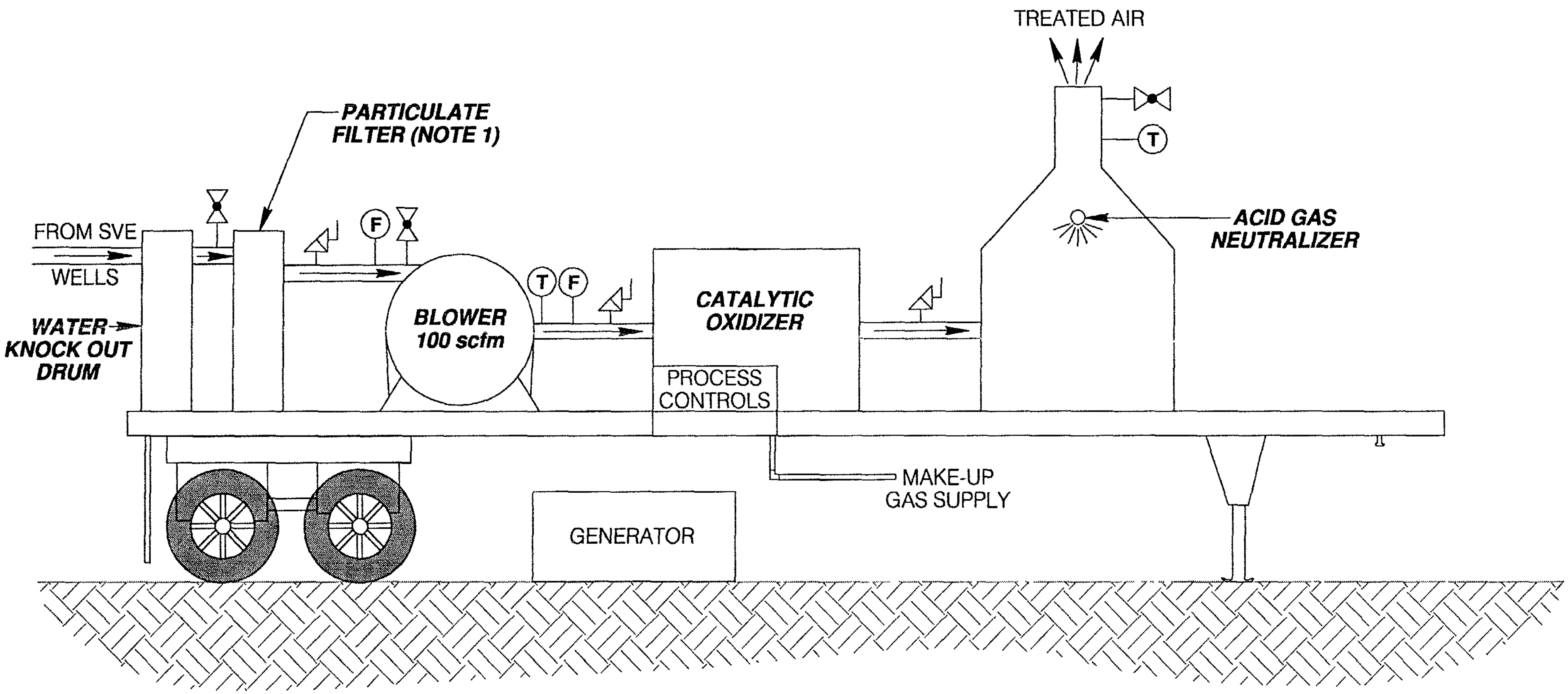
(1) THE DEPTH OF THIS SEAL AND SCREENED INTERVAL WAS DETERMINED ON A WELL BY WELL BASIS BASED ON ENCOUNTERED LITHOLOGY.

(2) THE BOTTOM BLANK SECTION ACTS AS A SUMP TO COLLECT LIQUID.

SCHEMATIC OF TYPICAL SVE TEST WELL CONSTRUCTION NATIVE SOIL

WASTE DISPOSAL, INC.
SANTA FE SPRINGS, CALIFORNIA

TRC	FIGURE 2.4B



NOT TO SCALE

LEGEND

F FLOWMETER
T TEMPERATURE PROBE
SAMPLE PORT
PRESSURE RELIEF VALVE

NOTES:
(1) PARTICULATE FILTER IS SHOWN AS A SEPARATE UNIT, BUT ITS FUNCTION CAN ALSO BE ACCOMPLISHED BY A HIGH EFFICIENCY DEMISTER INSTALLED INSIDE THE WATER KNOCKOUT DRUM.

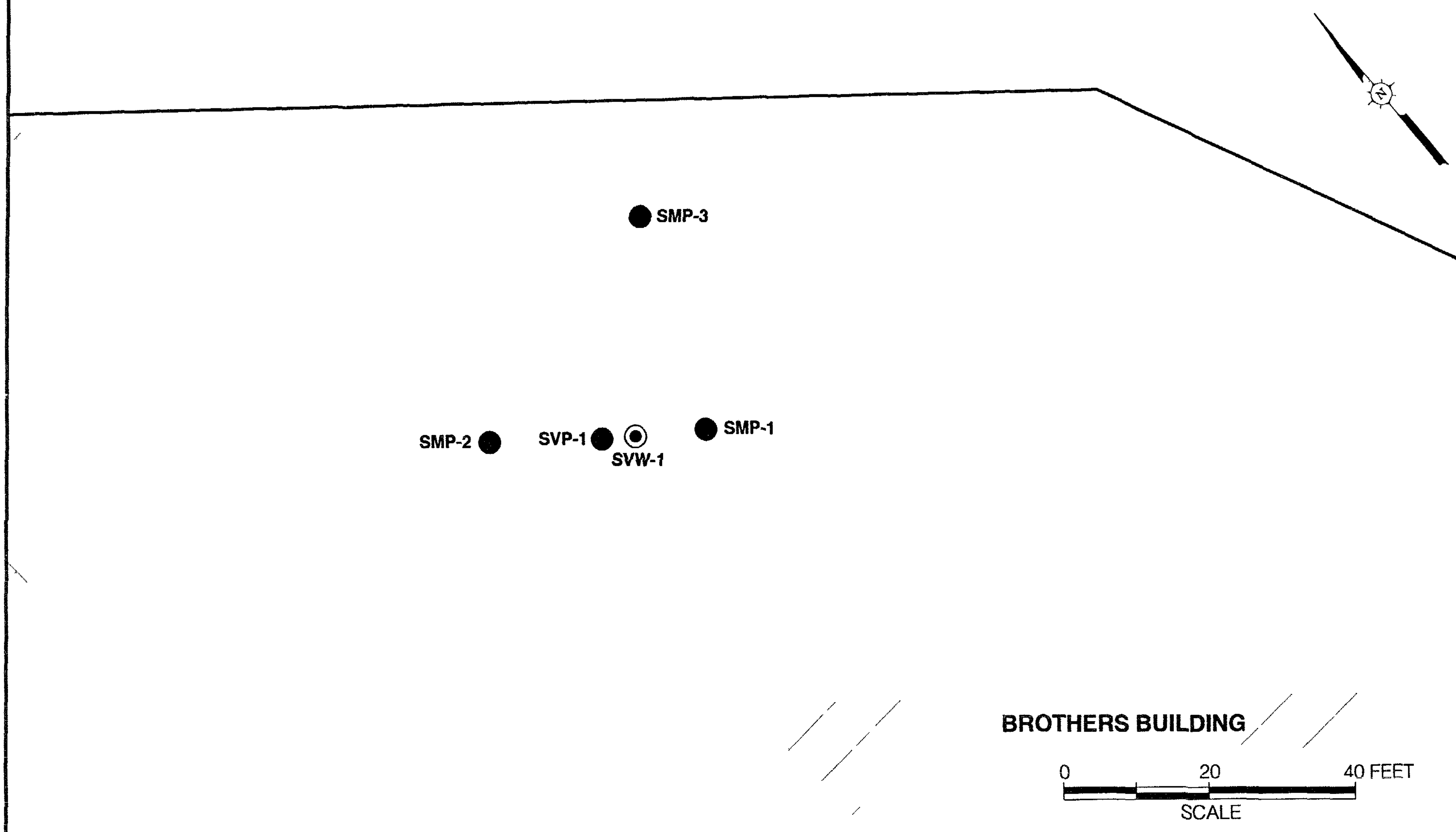
SCHEMATIC OF TYPICAL SVE TEST EQUIPMENT

WASTE DISPOSAL, INC.
SANTA FE SPRINGS, CALIFORNIA

TRC

FIGURE 2.5

94-256TM9AROF-46 REV 02/25/99



LEGEND

◉ VAPOR EXTRACTION WELL

● VAPOR WELL OR MONITORING POINT

REFERENCE NUNEZ ENGINEERING, SURVEY DRAWING NE 97187, OCT 31, 1997

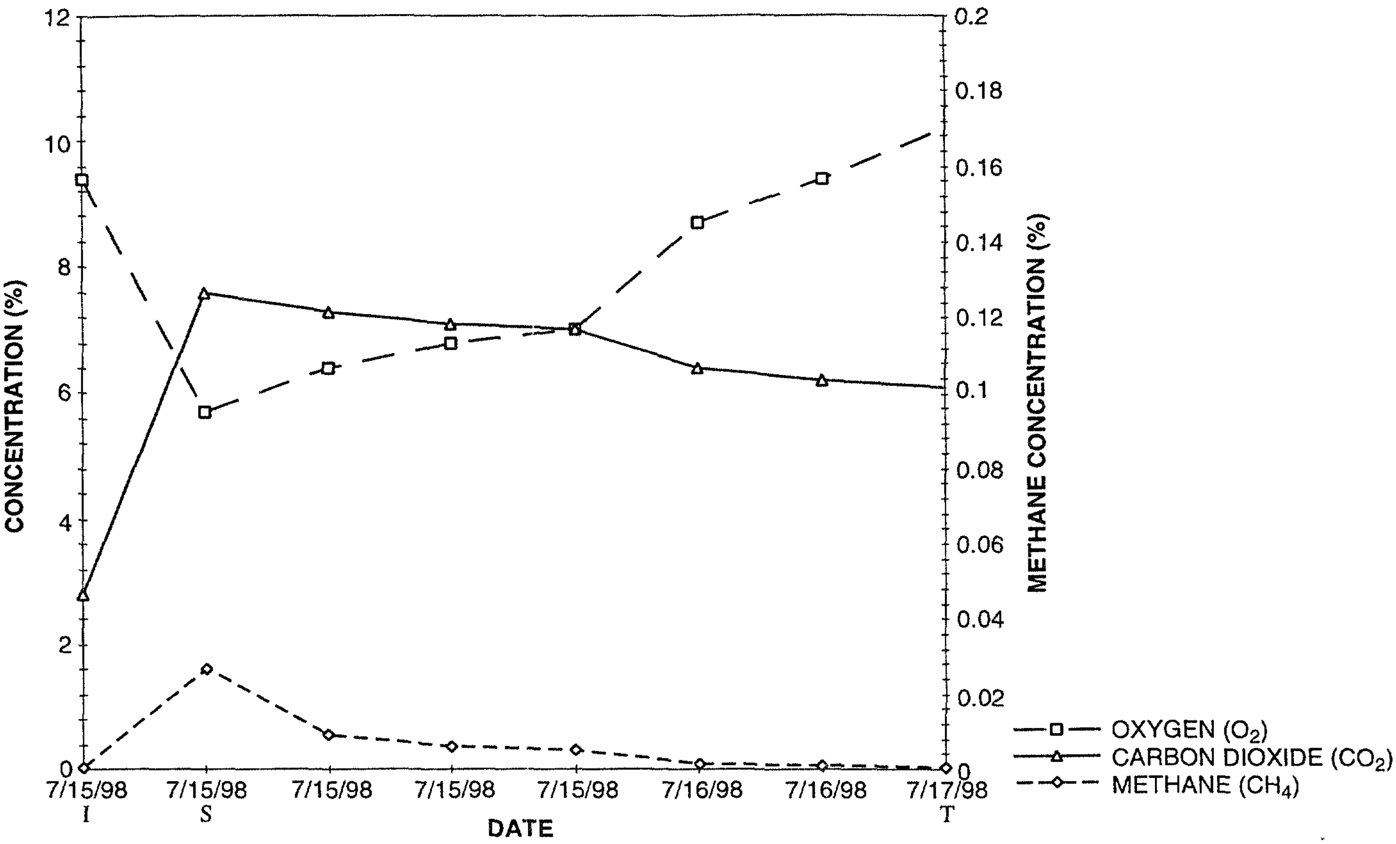
AS-BUILT

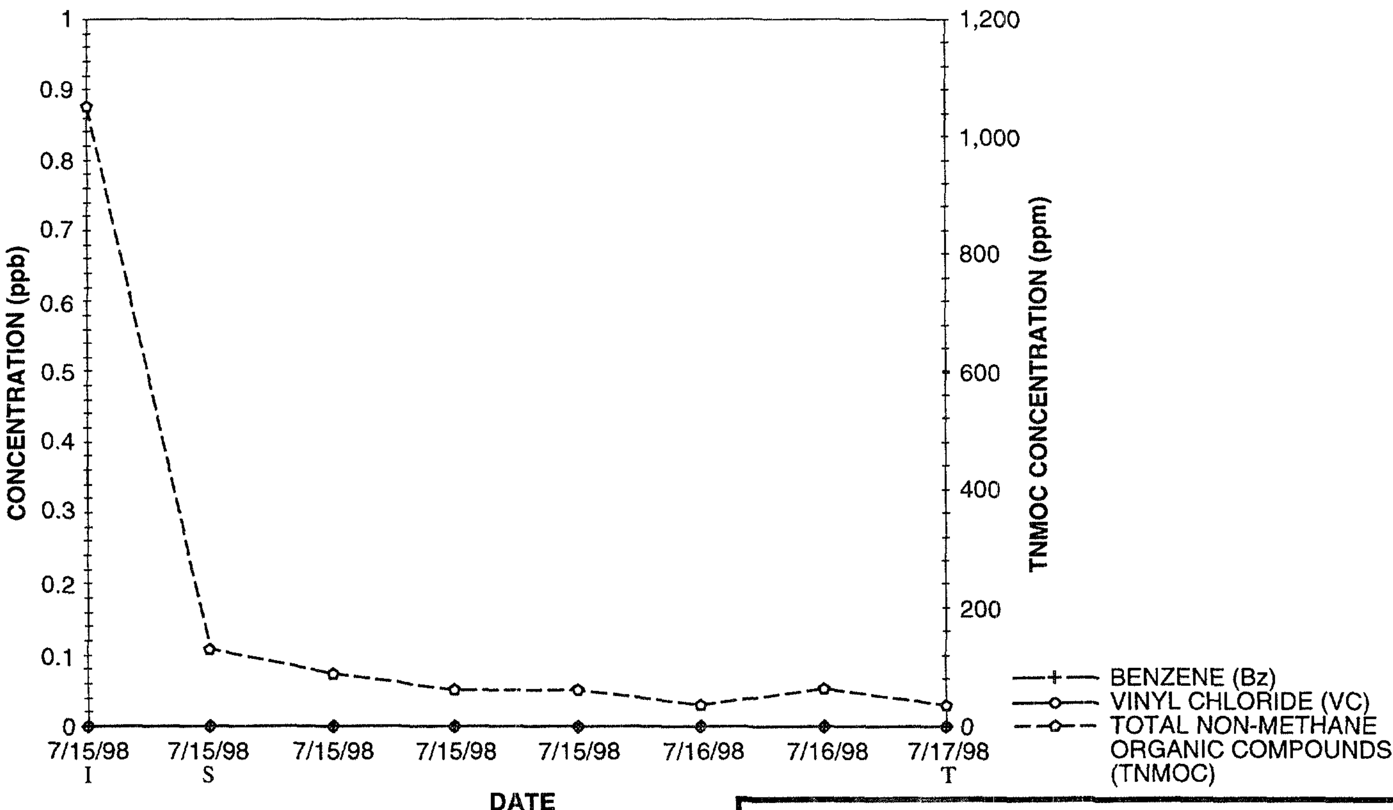
BROTHERS SVE TEST AREA
SHALLOW MONITORING WELL LOCATIONS

WASTE DISPOSAL, INC
SANTA FE SPRINGS, CALIFORNIA

TRC

FIGURE 3.1





LEGEND

I = INITIAL RESULTS PRIOR TO STARTUP

S = STARTUP

T = SVE OPERATIONS TERMINATED

BROTHERS (AREA 5) SHALLOW ZONE SVE TEST LABORATORY RESULTS DURING ACTIVE PHASE

WASTE DISPOSAL, INC.
SANTA FE SPRINGS, CALIFORNIA

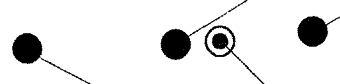
TRC

FIGURE 3.2

SMP-3	9/11/98	10/15/98 (1)	11/05/98 (1)	12/15/98 (1)	1/19/99 (1)
CH_4	0.0	0.0	0.0 [15]	0.0	0.0
CO_2	0.1	1.3	0.7	0.6	5.8
O_2	8.9	19.3	20.1	18.4	9.2

SVP-1	9/11/98	10/15/98 (1)	11/05/98 (1)	12/15/98 (1)	1/19/99 (1)
CH_4	0.0	0.0	0.1	0.1	0.0
CO_2	5.9	8.0	8.4	8.2	7.7
O_2	13.9	2.2	4.4	4.6	3 3

SMP-1	9/11/98	10/09/98 (1)	11/05/98 (1)	12/15/98 (1)	1/19/99(1)
CH_4	26.0	0.0	0.1	0.1	0.0
CO_2	7.3	10.3	10.1	11.7	9.1
O_2	0.0	5.8	2 0	1.4	0.0



SMP-2	9/11/98	10/15/98 (1)	11/05/98 (1)	12/15/98 (1)	1/19/99 (1)
CH_4	0.0	0.0	0.1	0.1	0.0
CO_2	4.5	1.4	6.6	6.3	7.3
O_2	15.3	19.5	10.9	8.9	8 2

SVW-1	INITIAL 7/14/98	9/11/98	10/09/98 (1)	11/05/98 (1)	12/15/98 (1)	1/19/99 (1)
CH_4	0.2	0.0	0.0	0.0 [140]	0.0 [280]	0.0
CO_2	2.7	7.9	7.6	9.4	9.2	8.1
O_2	9.3	10.3	7.5	2 7	2.4	1.8

BROTHERS BUILDING

0 20 40 FEET

SCALE

LEGEND

◉ VAPOR EXTRACTION WELL

● VAPOR WELL OR MONITORING POINT

(1) RESULTS OBTAINED BY VACUUM PURGING ONE TO TWO WELL VOLUMES.

NOTE:
INITIAL READINGS WERE COLLECTED PRIOR TO SVE TREATMENT.
CH_4, CO_2, AND O_2, READINGS ARE RECORDED AS PERCENT CONCENTRATIONS.

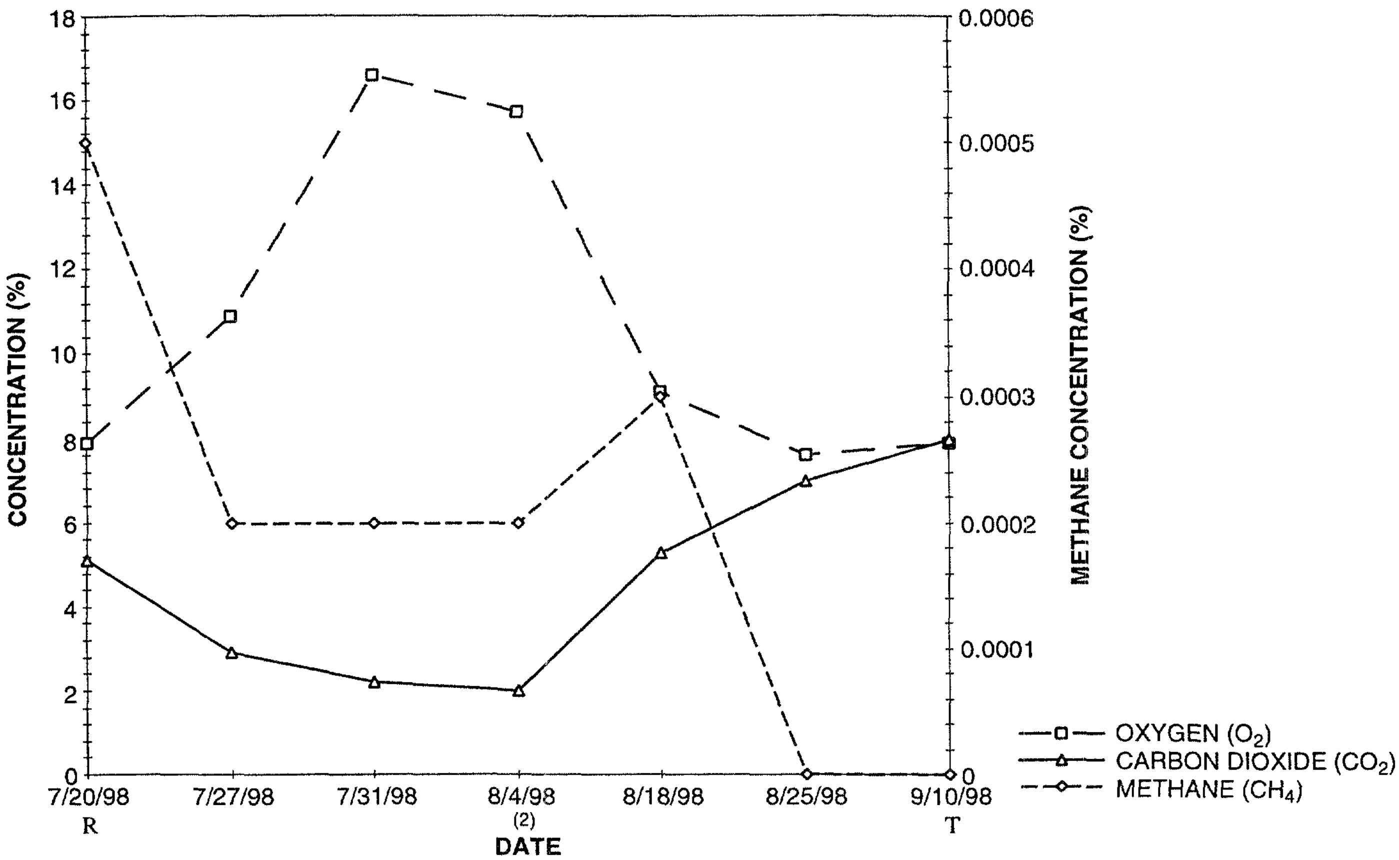
BROTHERS SVE TEST AREA ZONE OF INFLUENCE SHALLOW MONITORING WELL SOIL GAS RESULTS

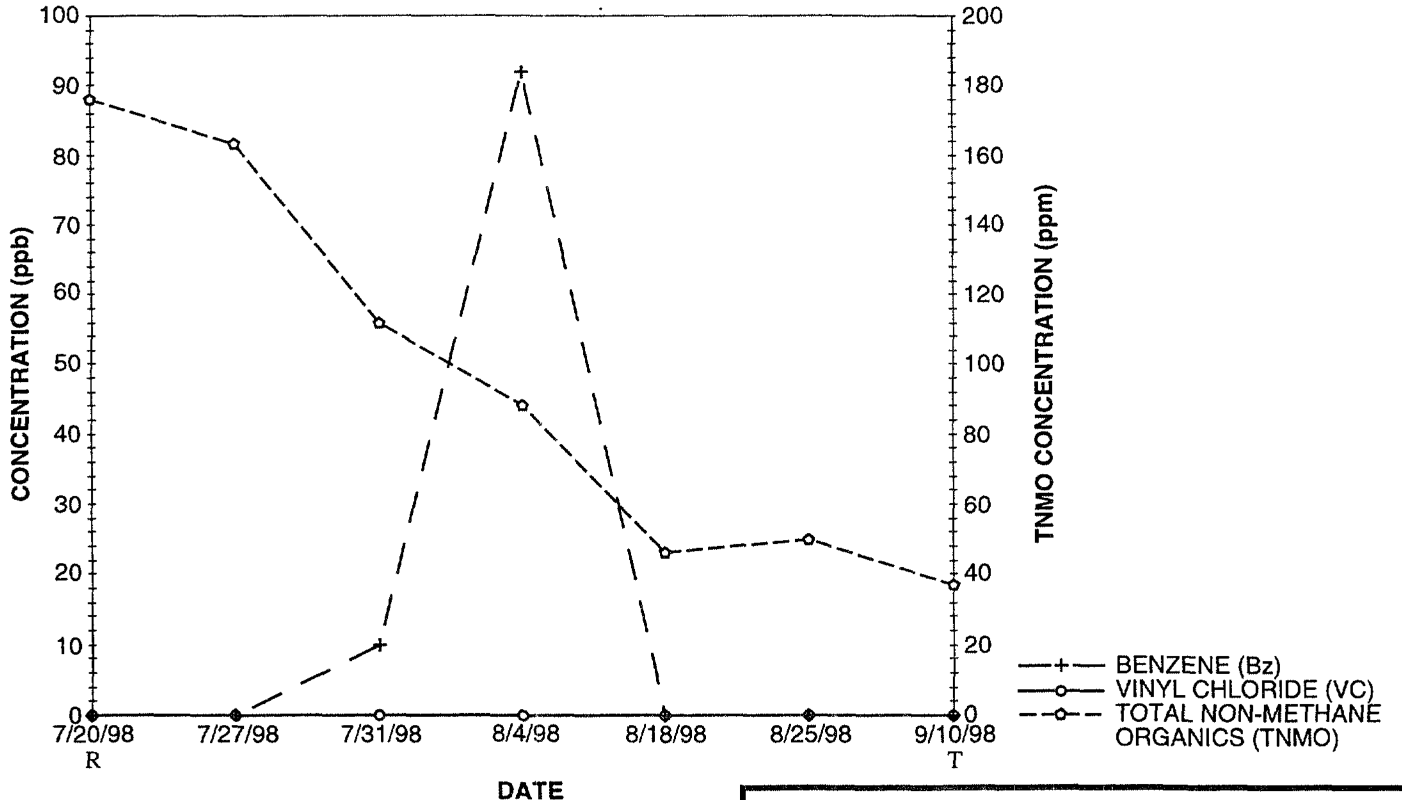
WASTE DISPOSAL, INC.
SANTA FE SPRINGS, CALIFORNIA

TRC

FIGURE 3.3

94-256TM9AROF-35 REV.02/26/99





LEGEND

R = RECOVERY MONITORING INITIATED

T = RECOVERY MONITORING TERMINATED AND FIELD MONITORING USING EPA PURGING PROCEDURE INITIATED.

NOTES:
(1) PRIOR TO EPA PURGING PROCEDURE.
(2) APPEARS TO BE RELATED TO BIOGRADATION (I.E., CO_2 INCREASED 0_2 DECREASED.

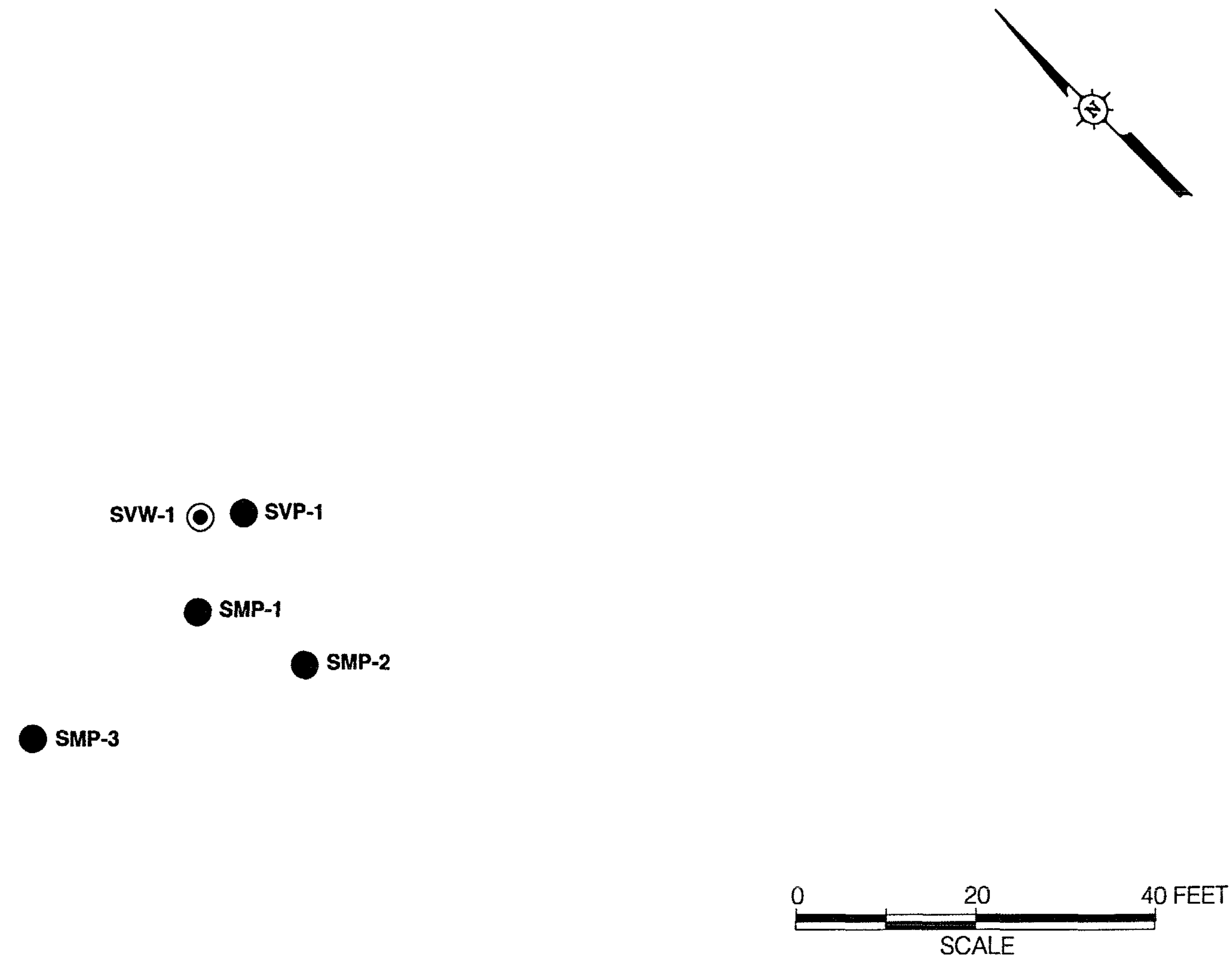
BROTHERS SHALLOW ZONE SVE TESTING LABORATORY RESULTS DURING RECOVERY PERIOD (1)

WASTE DISPOSAL, INC.
SANTA FE SPRINGS, CALIFORNIA

TRC

FIGURE 3.4

94-256TM9AROF-59 REV 02/26/99



LEGEND

- ◉ VAPOR EXTRACTION WELL
- ● VAPOR WELL OR MONITORING POINT

AS-BUILT

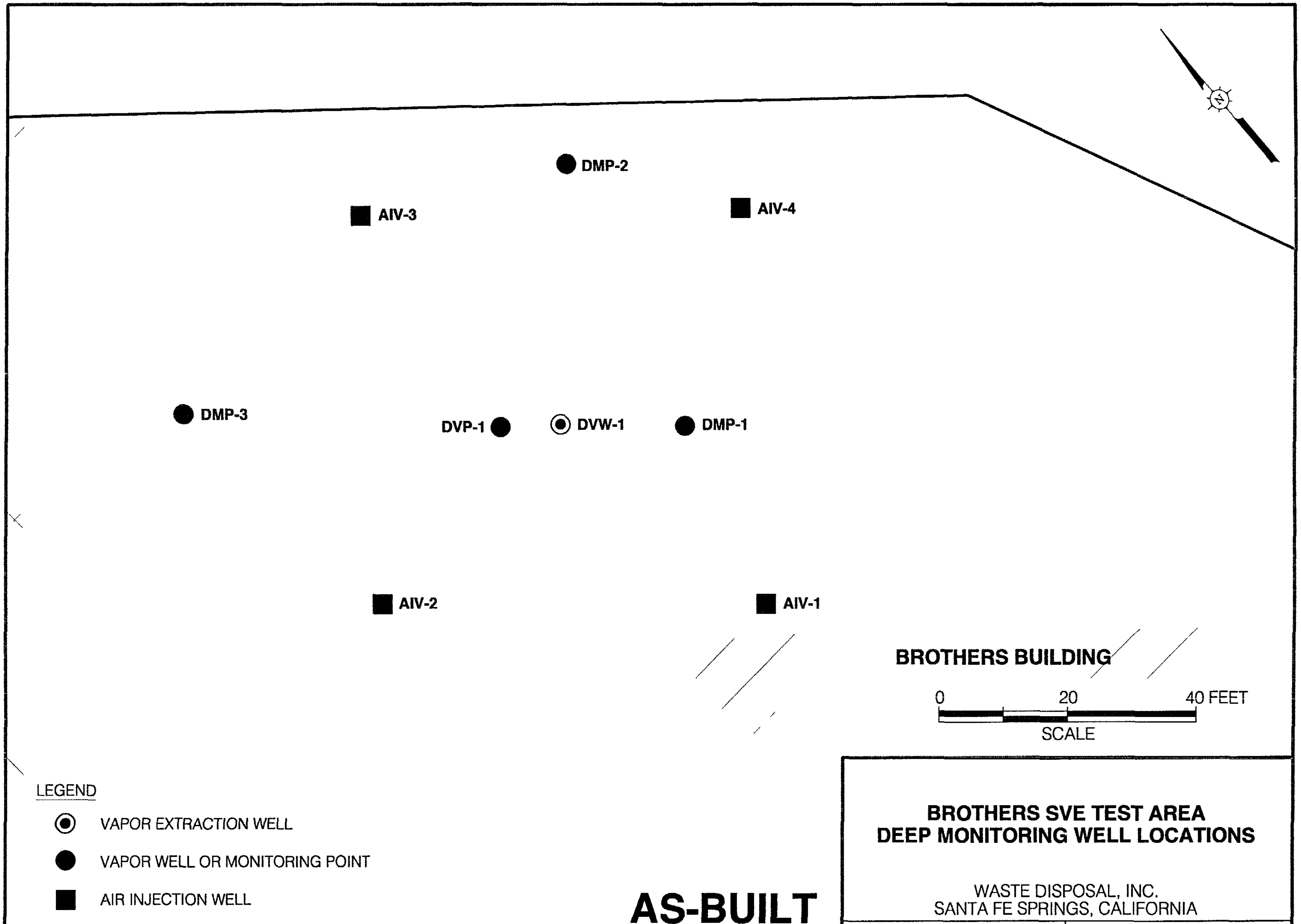
REFERENCE. NUNEZ ENGINEERING, SURVEY DRAWING NE 97187, OCT. 31, 1997.

RV STORAGE LOT SVE TEST AREA
SHALLOW MONITORING WELL LOCATIONS

WASTE DISPLOSAL, INC.
SANTA FE SPRINGS, CALIFORNIA

TRC

FIGURE 3.5



REFERENCE NUNEZ ENGINEERING, SURVEY DRAWING NE 97187, OCT 31, 1997

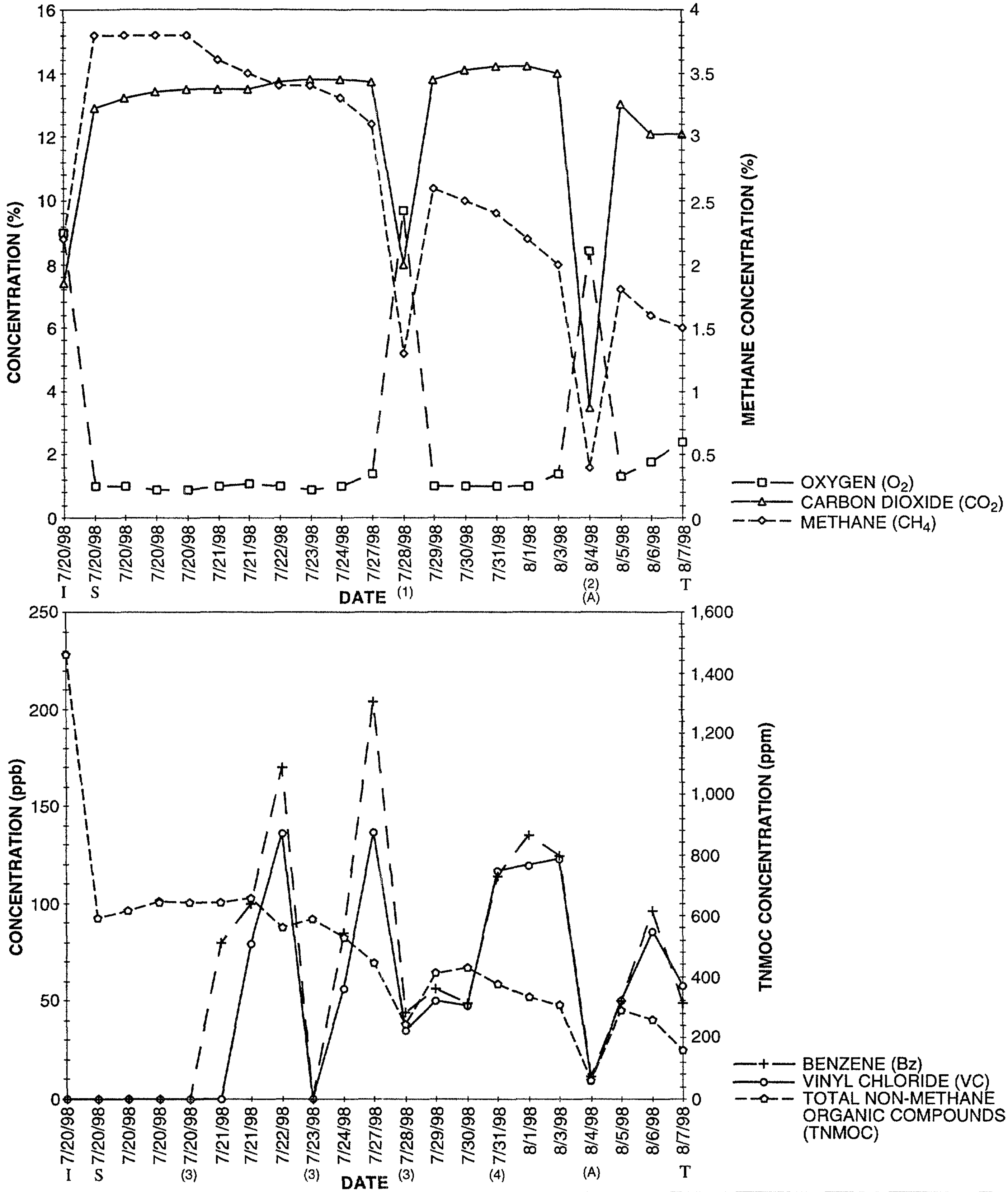
BROTHERS SVE TEST AREA
DEEP MONITORING WELL LOCATIONS

WASTE DISPOSAL, INC.
SANTA FE SPRINGS, CALIFORNIA

TRC

FIGURE 3.6

94-256TM9AROF-39 REV.02/26/99



LEGEND

I = INITIAL RESULTS PRIOR TO STARTUP

S = STARTUP

T = SVE OPERATIONS TERMINATED

NOTES:
(1) MONITORING FAILED DUE TO SAMPLING LINE LEAK.
(2) LABORATORY METHANE LEVELS WERE LOW COMPARED TO FIELD MONITORING. NO OPERATIONAL CHANGES.
(3) VACUUM LEVELS INCREASED, FLOW WAS UNCHANGED INDICATING VOLATILIZATION OF HYDROCARBONS.
(4) VACUUM INCREASED AND FLOW INCREASED.
(A) AIR INJECTION WELLS OPENED.

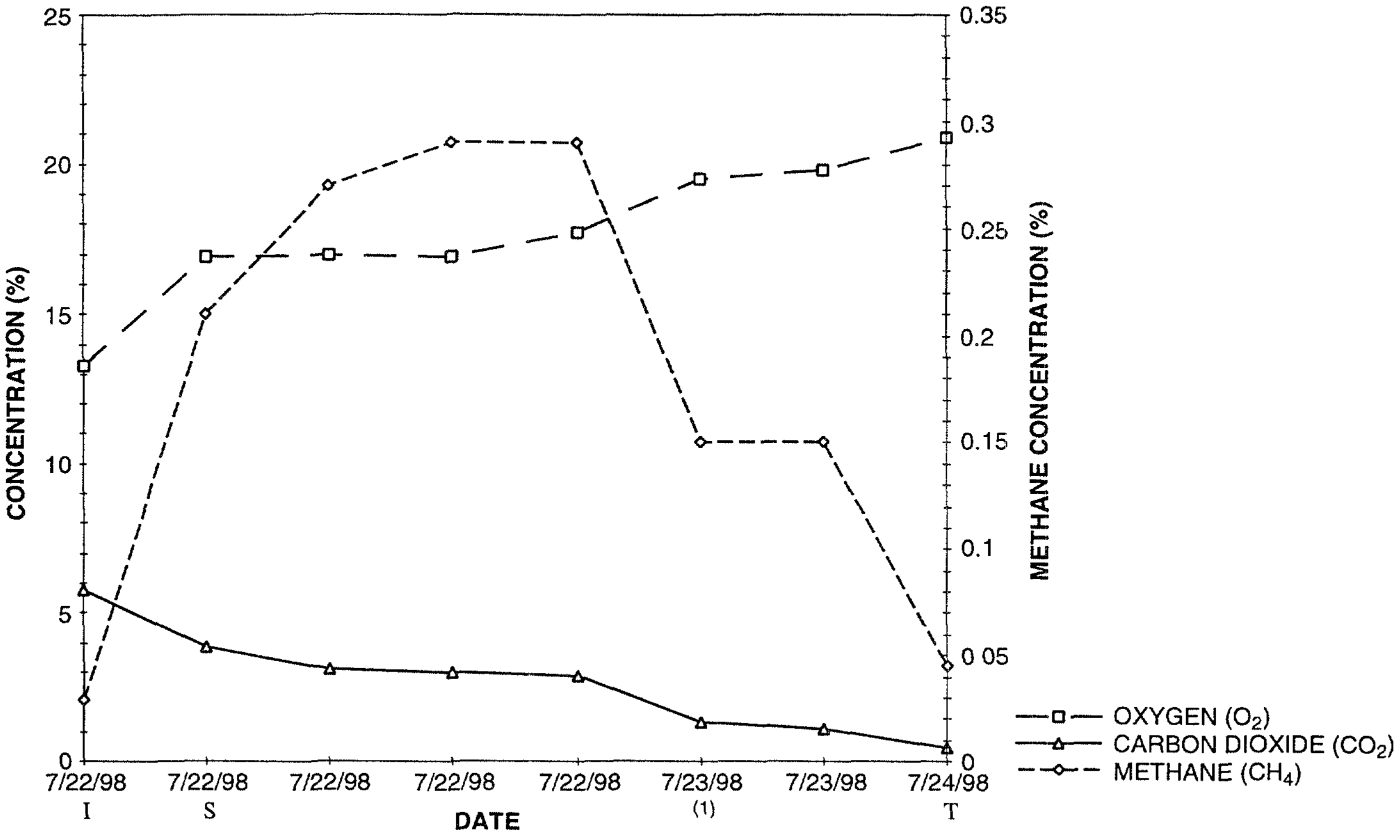
BROTHERS (AREA 5) DEEP ZONE SVE TEST LABORATORY RESULTS DURING ACTIVE PHASE

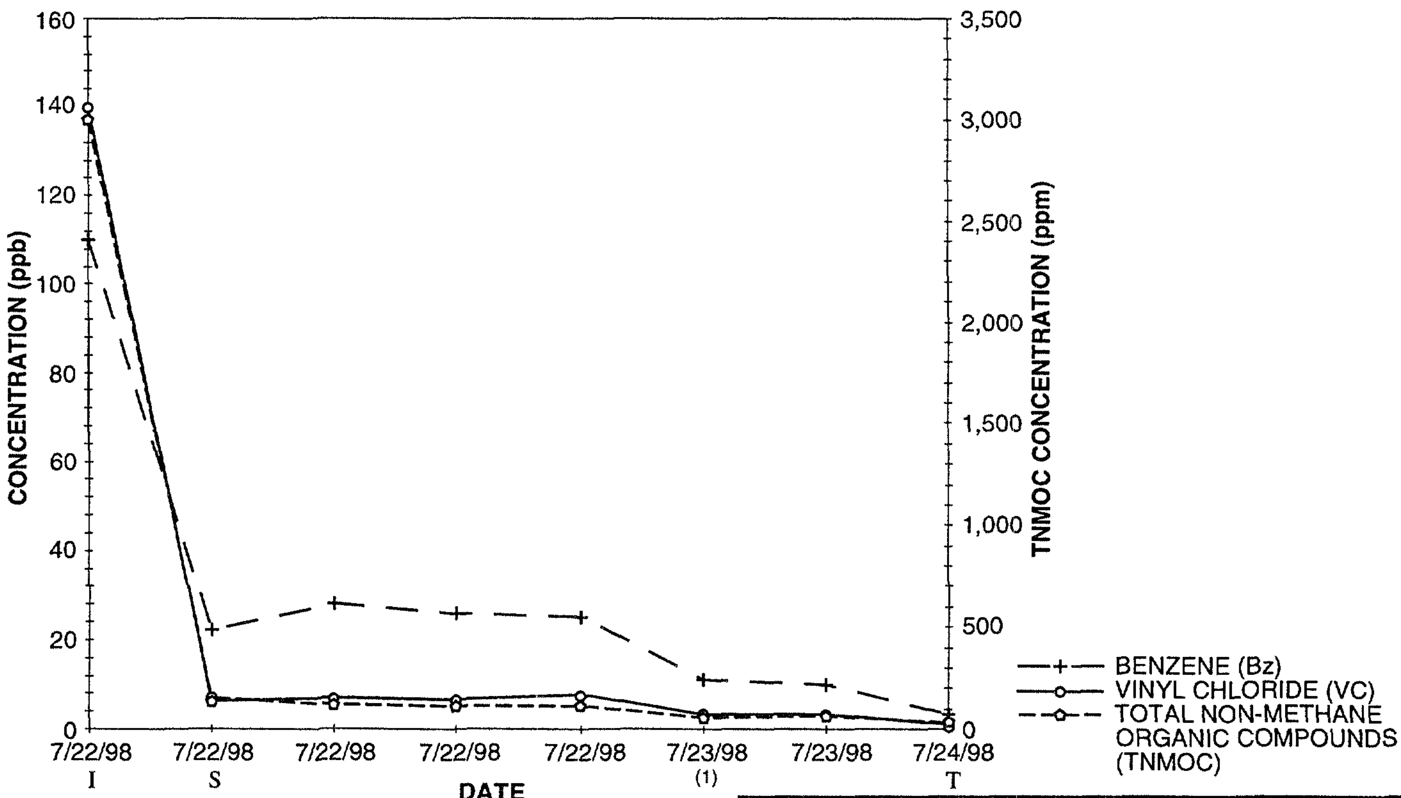
WASTE DISPOSAL, INC.
SANTA FE SPRINGS, CALIFORNIA

TRC

FIGURE 3.7

94-256TM9AROF-29 REV.02/26/99





LEGEND

I = INITIAL RESULTS PRIOR TO STARTUP

S = STARTUP

T = SVE OPERATIONS TERMINATED

NOTE:

(1) FLOW LEVELS DECREASED.

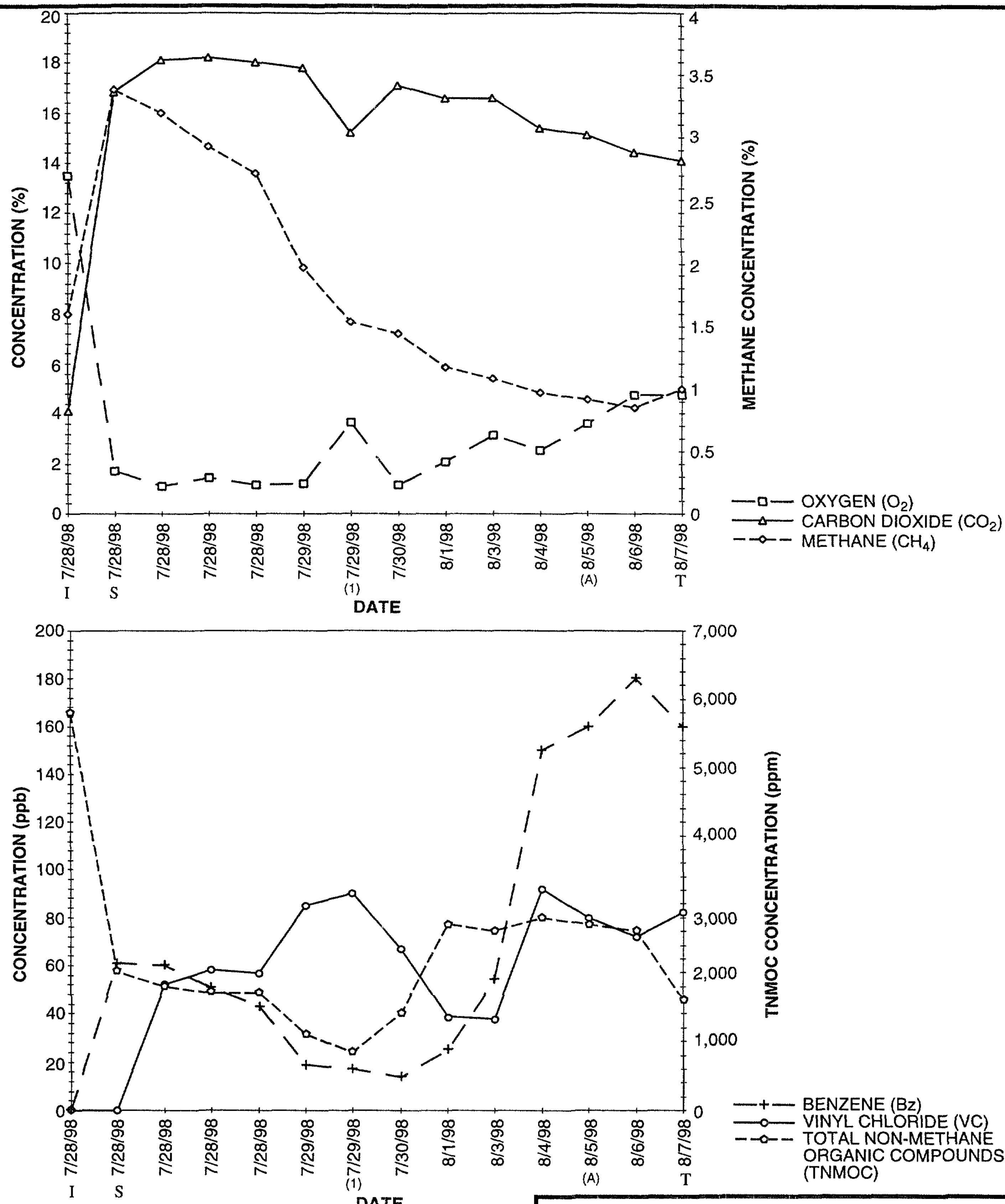
C&E DIE SHALLOW ZONE SVE TEST LABORATORY RESULTS DURING ACTIVE PHASE

WASTE DISPOSAL, INC.
SANTA FE SPRINGS, CALIFORNIA

TRC

FIGURE 3.8

94-256TM9AROF-38 REV.02/26/99



LEGEND

I = INITIAL RESULTS PRIOR TO STARTUP

S = STARTUP

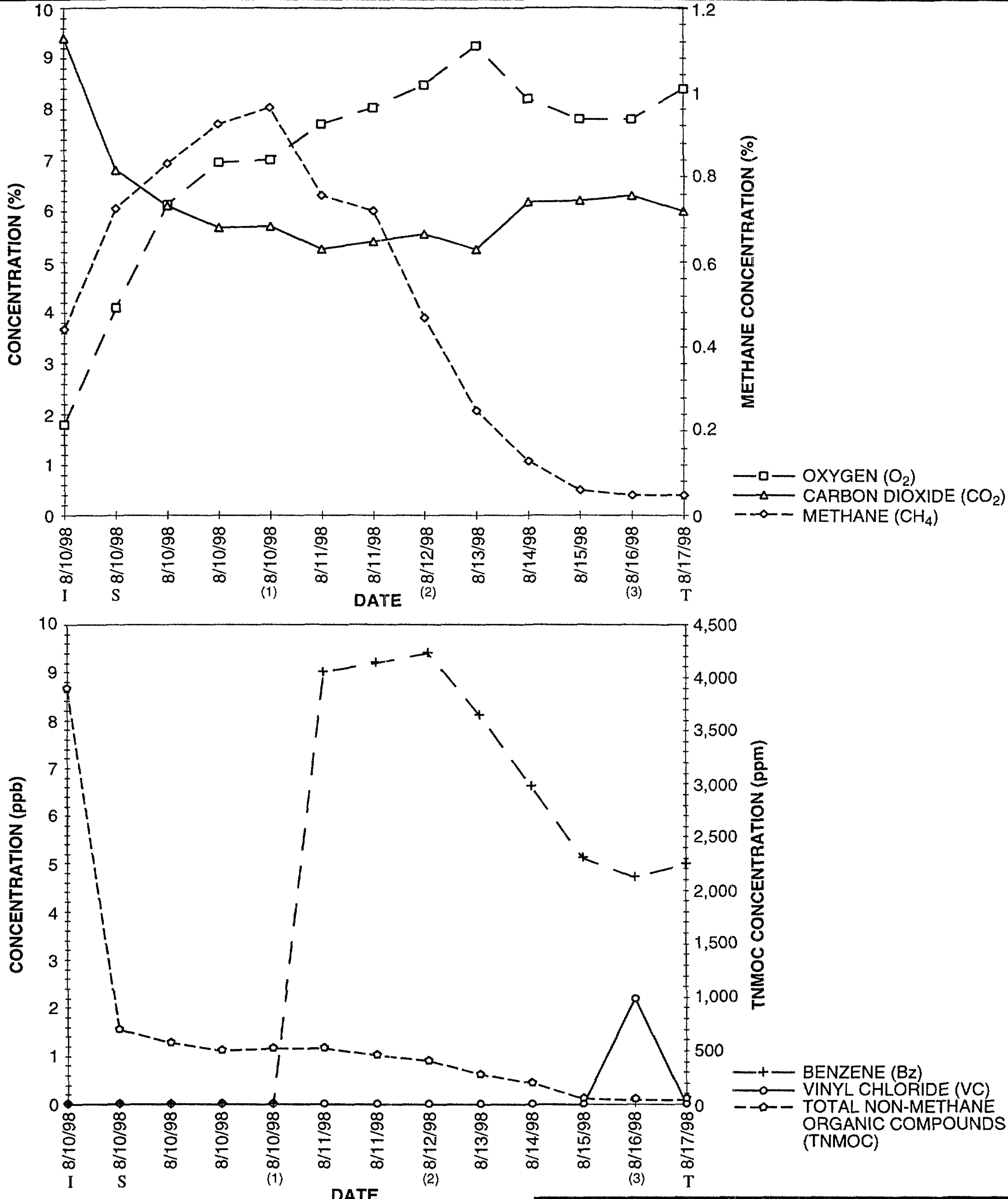
T = SVE OPERATIONS TERMINATED

NOTES:
(1) WELLHEAD FLOW INCREASED
(A) AIR INJECTION VENT OPENED.

C&E DIE DEEP ZONE SVE TEST LABORATORY RESULTS DURING ACTIVE PHASE

WASTE DISPOSAL, INC.
SANTA FE SPRINGS, CALIFORNIA

TRC | **FIGURE 3.9**



LEGEND

I = INITIAL RESULTS PRIOR TO STARTUP

S = STARTUP

T = SVE OPERATIONS TERMINATED

NOTES:

(1) FLOW INCREASED INDICATING VOLATILIZATION OF HYDROCARBONS.
(2) FLOW INCREASED.
(3) VINYL CHLORIDE WAS DETECTED IN ONE SAMPLE AT 2.2 ppb.

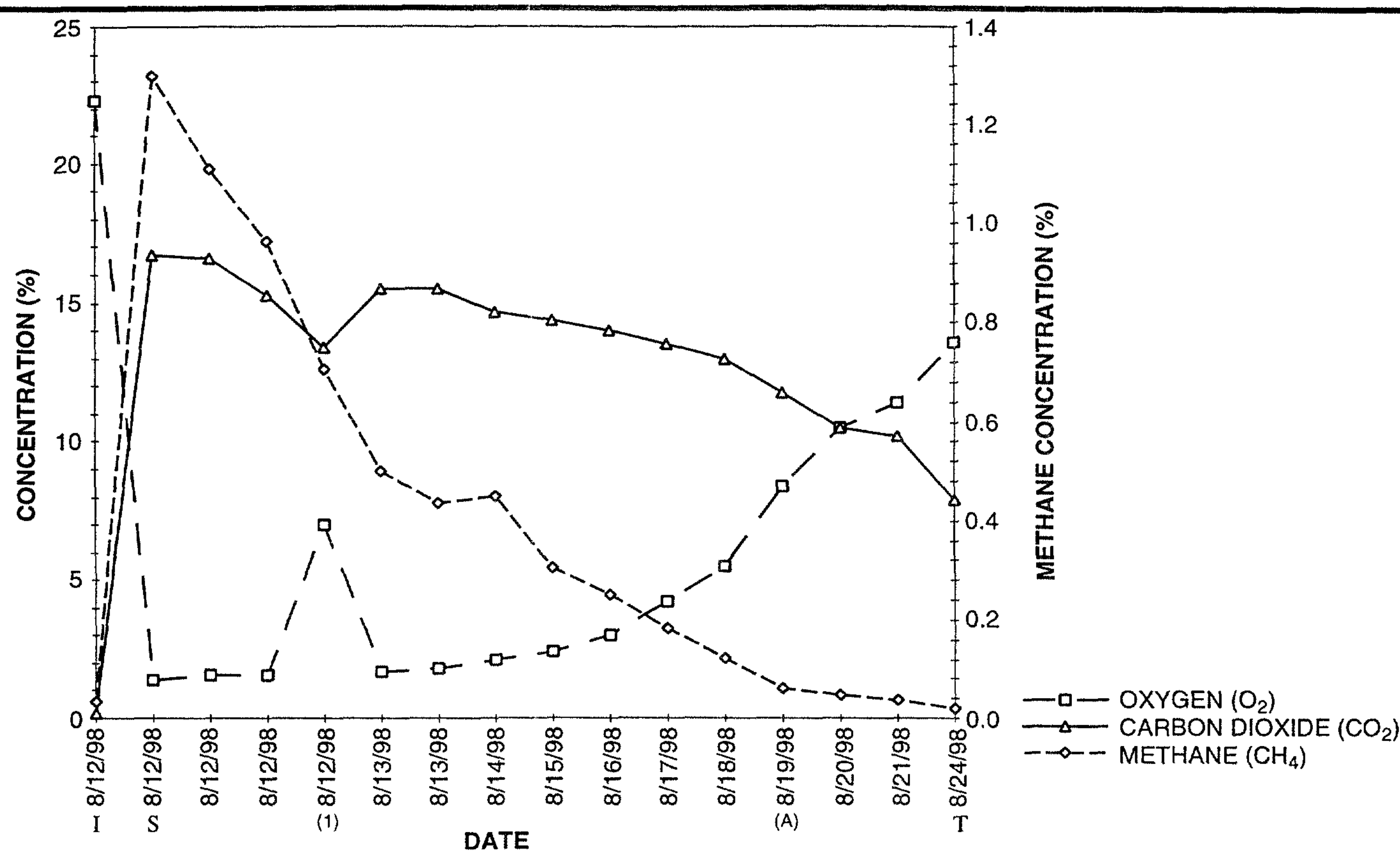
AREA 7 SHALLOW ZONE SVE TEST LABORATORY RESULTS DURING ACTIVE PHASE

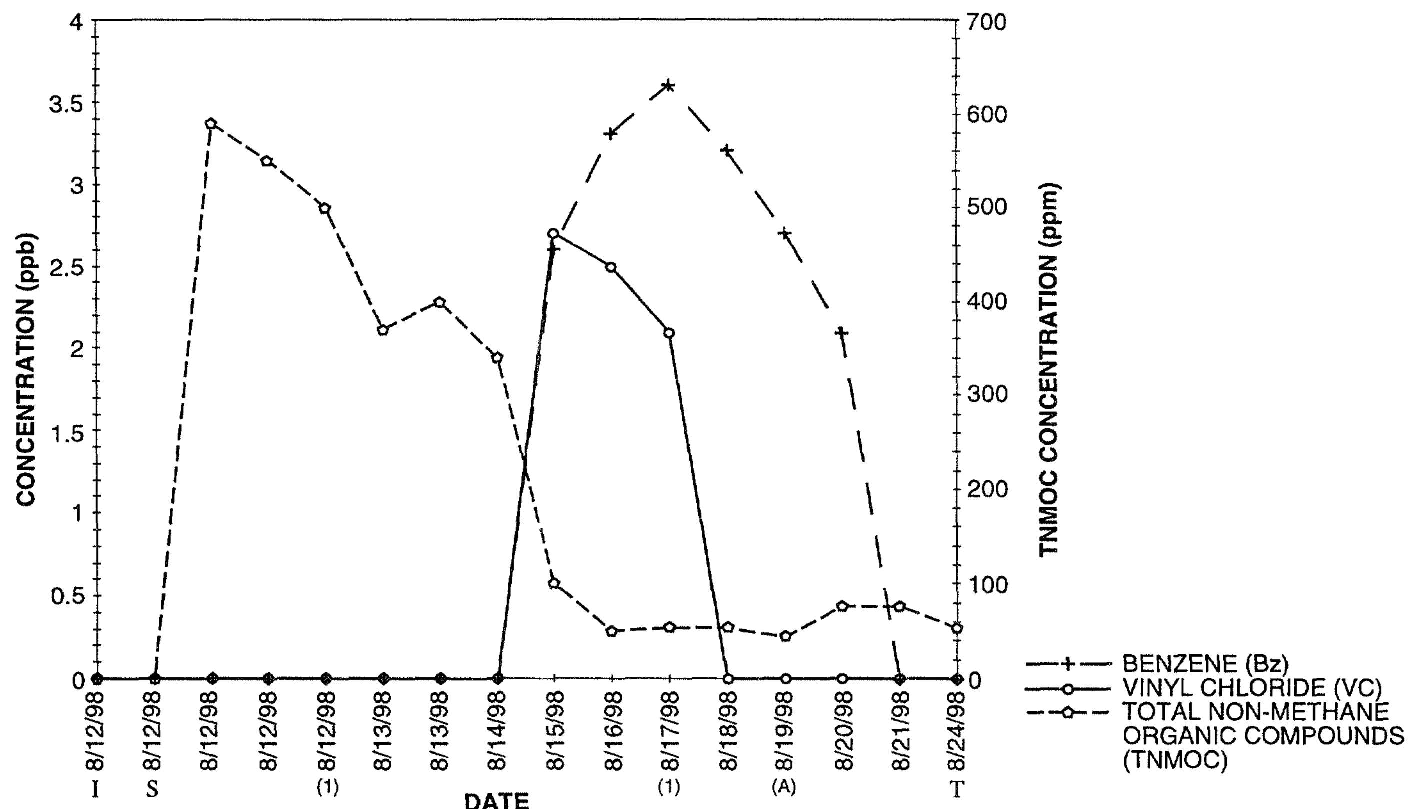
WASTE DISPOSAL, INC.
SANTA FE SPRINGS, CALIFORNIA

TRC

FIGURE 3.10

94-256TM9AROF-41 REV 02/26/99





LEGEND

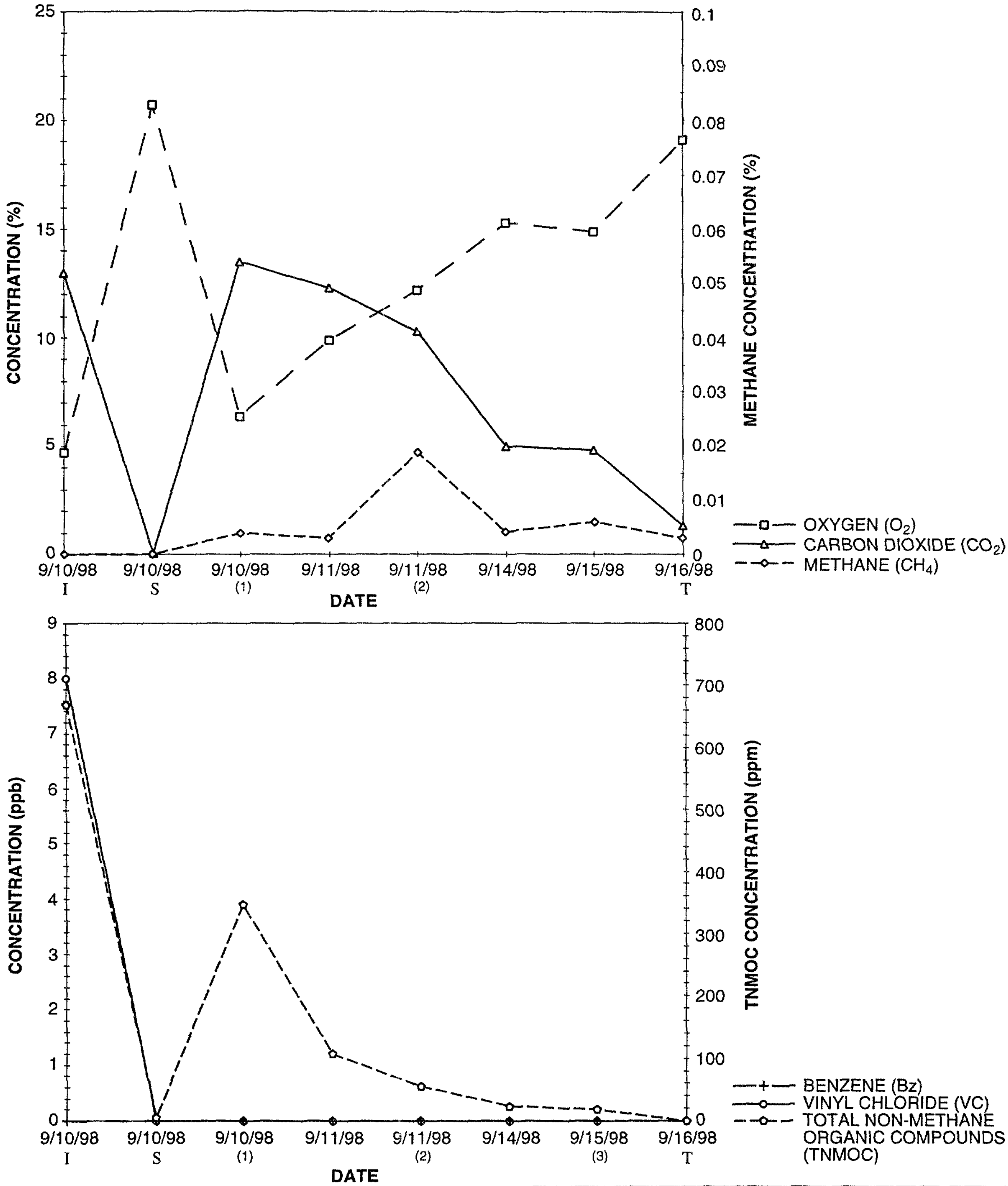
I = INITIAL RESULTS PRIOR TO STARTUP
S = STARTUP
T = SVE OPERATIONS TERMINATED

NOTES.
(1) VACUUM INCREASED
(A) AIR INJECTION VENT OPENED

AREA 7 DEEP ZONE SVE TEST LABORATORY RESULTS DURING ACTIVE PHASE

WASTE DISPOSAL, INC.
SANTA FE SPRINGS, CALIFORNIA

TRC | **FIGURE 3.11**



LEGEND

I = INITIAL RESULTS PRIOR TO STARTUP

S = STARTUP

T = SVE OPERATIONS TERMINATED

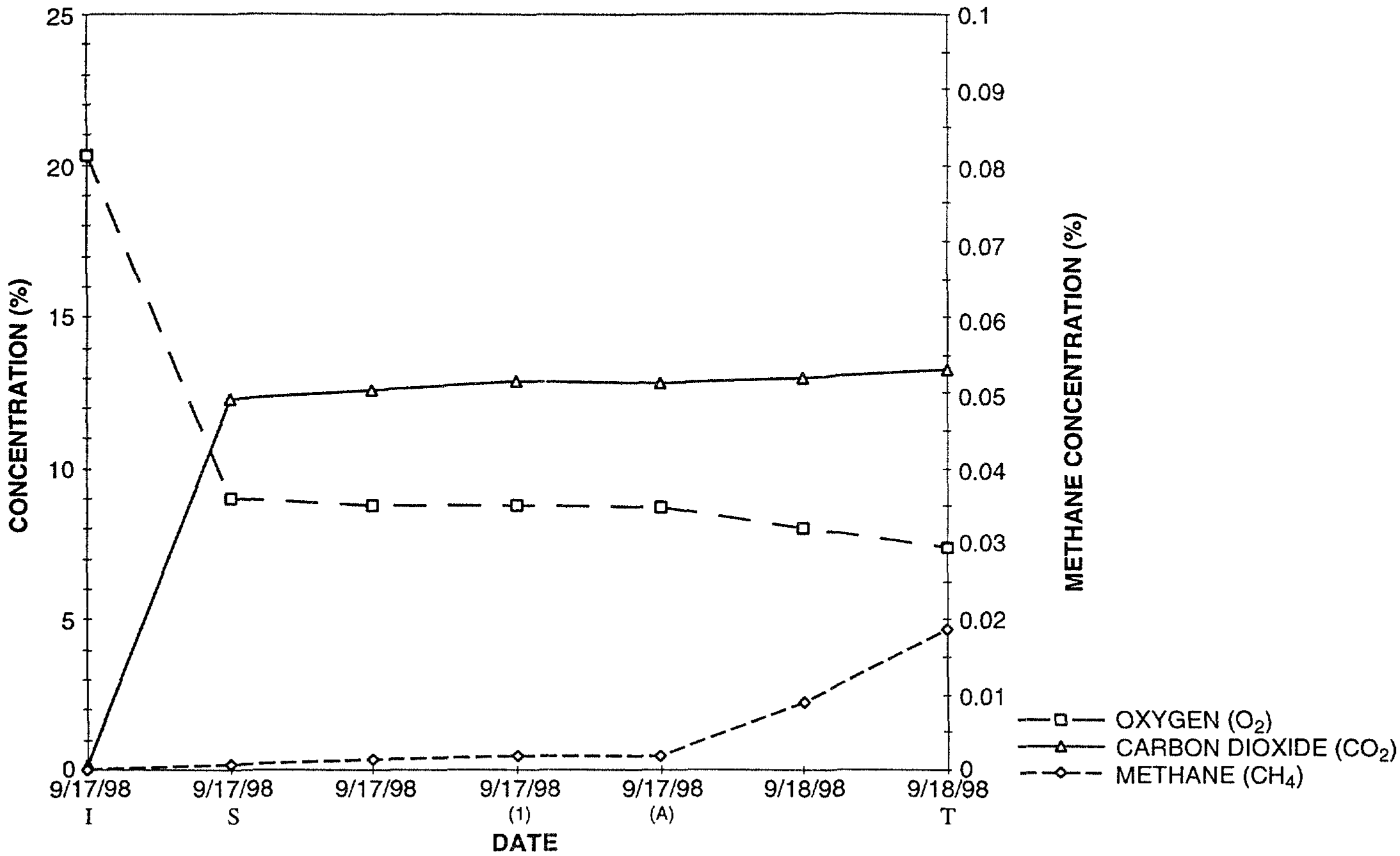
NOTES:
(1) VACUUM DECREASED, FLOW MAINTAINED.
(2) VACUUM INCREASED, FLOW DECREASED.
(3) FLOW INCREASED.

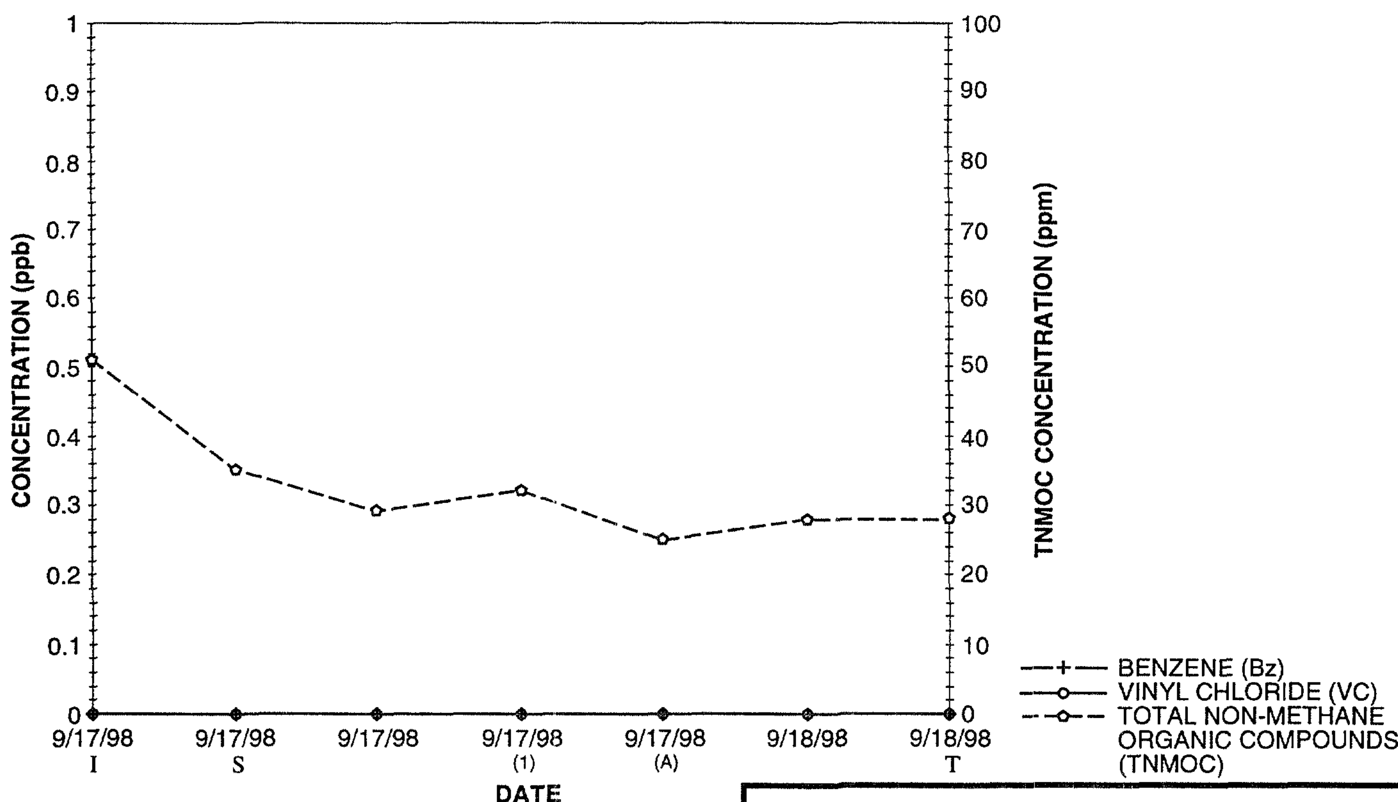
AREA 8 SHALLOW ZONE SVE TEST LABORATORY RESULTS DURING ACTIVE PHASE

WASTE DISPOSAL, INC.
SANTA FE SPRINGS, CALIFORNIA

TRC | **FIGURE 3.12**

94-256TM9AROF-40 REV.02/26/99





LEGEND

I = INITIAL RESULTS PRIOR TO STARTUP

S = STARTUP

T = SVE OPERATIONS TERMINATED

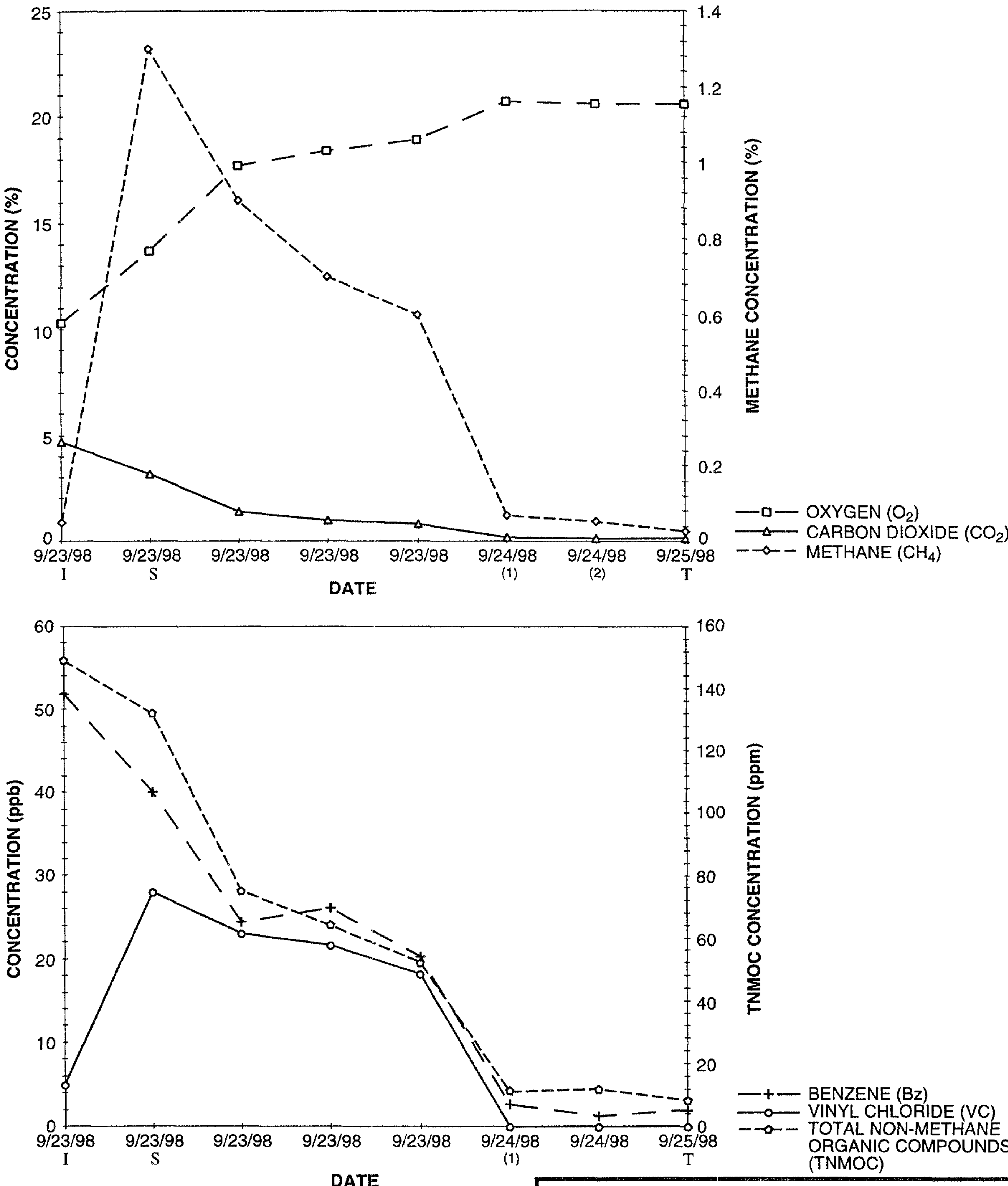
NOTES:
(1) FLOW INCREASED, VACUUM MAINTAINED.
(A) AIR INJECTION VENT OPENED

AREA 8 DEEP ZONE SVE TEST LABORATORY RESULTS DURING ACTIVE PHASE

WASTE DISPOSAL, INC.
SANTA FE SPRINGS, CALIFORNIA

TRC | **FIGURE 3.13**

94-256TM9AROF-28 REV 02/26/99



LEGEND

I = INITIAL RESULTS PRIOR TO STARTUP

S = STARTUP

T = SVE OPERATIONS TERMINATED

NOTES

(1) VACUUM DECREASED, FLOW INCREASED

(2) VACUUM INCREASED, FLOW INCREASED

RV STORAGE LOT SHALLOW ZONE SVE TEST LABORATORY RESULTS DURING ACTIVE PHASE

WASTE DISPOSAL, INC.
SANTA FE SPRINGS, CALIFORNIA

TRC

FIGURE 3.14

94-256TM9AROF-61 REV 02/26/99

DMP-2

	9/11/98	10/09/98 (1)	11/05/98 (1)	11/20/98 (1)	12/17/98 (1)	1/20/99 (1)
CH_4	2.0	5.9	7.5	9.3	10.4	6.3
CO_2	15.3	13.0	14.7	14.5	16.2	14.5
O_2	0.6	0.0	0.0	0.0	0.0	0.0

AIV-3

	9/11/98	10/15/98 (1)	11/05/98 (1)	11/19/98 (1)	12/16/98 (1)	1/19/99 (1)
CH_4	0.2	2.2	3.8	1.9	1.9	3.2
CO_2	1.0	11.8	14.0	12.1	13.4	15.0
O_2	16.5	0.3	0.0	0.0	0.0	0.0

AIV-4

	9/11/98	10/15/98 (1)	11/05/98 (1)	11/20/98 (1)	12/17/98 (1)	1/19/99 (1)
CH_4	14.0	3.9	6.0	5.4	5.2	6.0
CO_2	5.0	13.3	14.9	15.4	16.7	15.2
O_2	10.5	0.0	0.0	0.0	0.0	0.0

DMP-3

	9/11/98	10/12/98 (1)	11/05/98 (1)	11/20/98 (1)	12/17/98 (1)	1/19/99 (1)
CH_4	0.2	1.0	1.6	0.4	0.5	1.8
CO_2	3.4	15.0	16.1	7.4	9.6	16.9
O_2	14.7	0.0	0.0	9.5	8.3	0.0

DVW-1

	INITIAL						
	7/17/98	9/11/98	10/09/98 (1)	11/05/98 (1)	11/20/98 (1)	12/17/98 (1)	1/19/99(1)
CH_4	3.0	0.1	1.3	2.3	1.9	1.8	2.4
CO_2	7.0	1.4	12.7	14.1	14.6	15.7	15.2
O_2	7.9	18.1	0.0	0.0	0.0	0.0	0.0

DMP-1

	9/11/98	10/12/98 (1)	11/05/98 (1)	11/20/98 (1)	12/17/98 (1)	1/19/99 (1)
CH_4	0.1	1.0	1.3	1.9	1.7	2.5
CO_2	6.0	12.3	14.0	14.1	15.6	14.4
O_2	9.8	0.0	0.0	0.0	0.0	0.0

DVP-1

	9/10/98	10/12/98 (1)	11/05/98 (1)	11/20/98 (1)	12/17/98 (1)	1/19/99 (1)
CH_4	0.0	0.9	2.3	1.1	1.0	2.2
CO_2	0.2	13.0	14.4	14.8	15.2	15.2
O_2	20.4	0.0	0.0	0.0	0.0	0.0

AIV-1

	9/11/98	10/12/98 (1)	11/05/98 (1)	11/20/98 (1)	12/17/98 (1)	1/19/99 (1)
CH_4	0.2	0.3	0.7	0.7	0.7	1.3
CO_2	1.2	12.4	13.6	14.1	13.6	14.5
O_2	16.1	0.0	0.0	0.0	0.0	0.0

AIV-2

	9/11/98	10/15/98 (1)	11/05/98 (1)	11/20/98 (1)	12/17/98 (1)	1/19/99(1)
CH_4	0.7	0.4	1.0	0.9	0.9	1.4
CO_2	13.9	15.0	16.1	16.1	15.7	16.8
O_2	0.0	0.0	0.0	0.0	0.0	0.0

BROTHERS BUILDING

0 20 40 FEET

SCALE

LEGEND

- VAPOR EXTRACTION WELL
- VAPOR WELL OR MONITORING POINT
- AIR INJECTION WELL

(1) RESULTS OBTAINED BY VACUUM PURGING ONE TO TWO WELL VOLUMES.

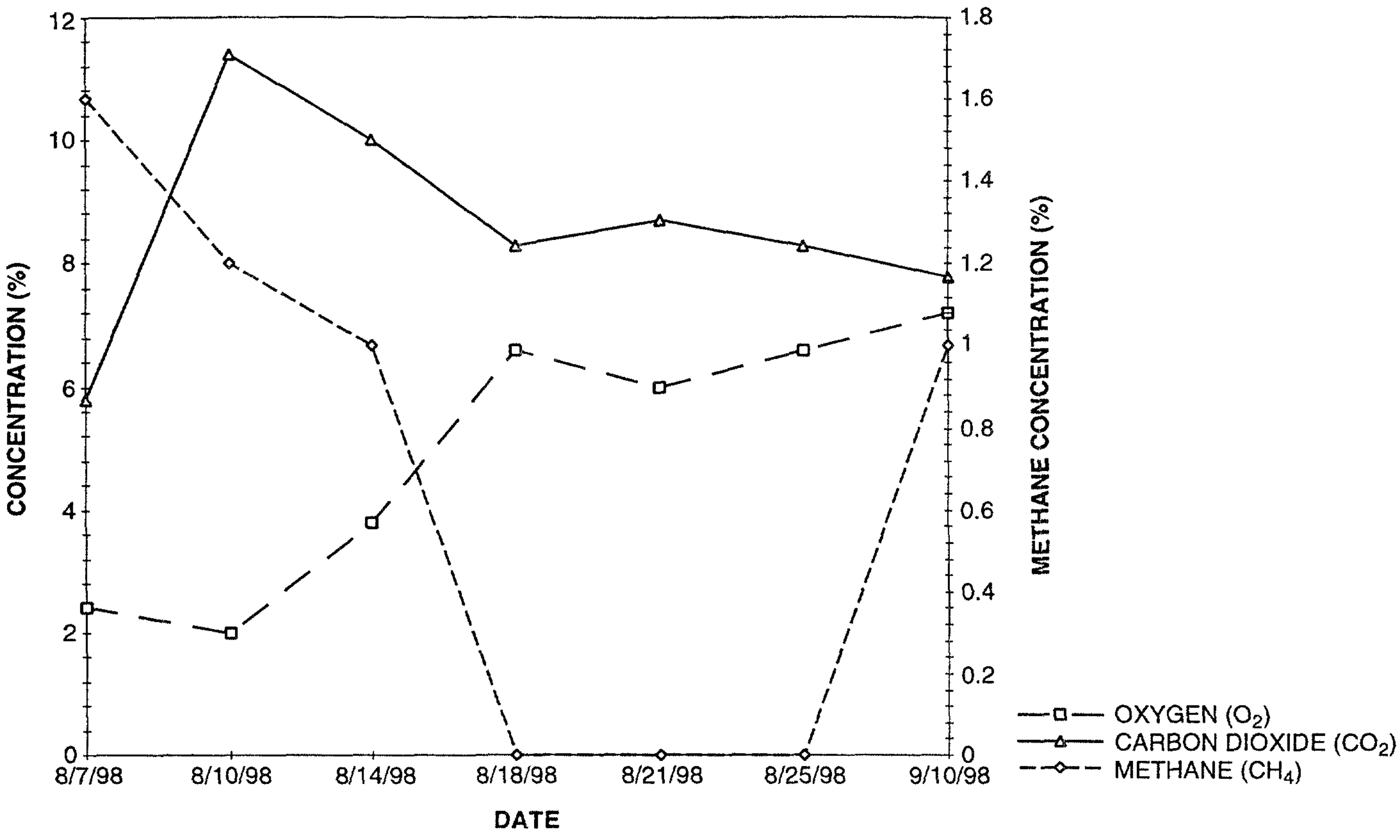
NOTE:
INITIAL READINGS WERE COLLECTED PRIOR TO SVE TREATMENT.
CH_4, CO_2, AND O_2 READINGS ARE RECORDED AS PERCENT CONCENTRATIONS.
SVE WELLS ARE LOCATED WITHIN FOOTPRINT OF THE SUMP-LIKE MATERIAL. REFER TO FIGURE 2.1.

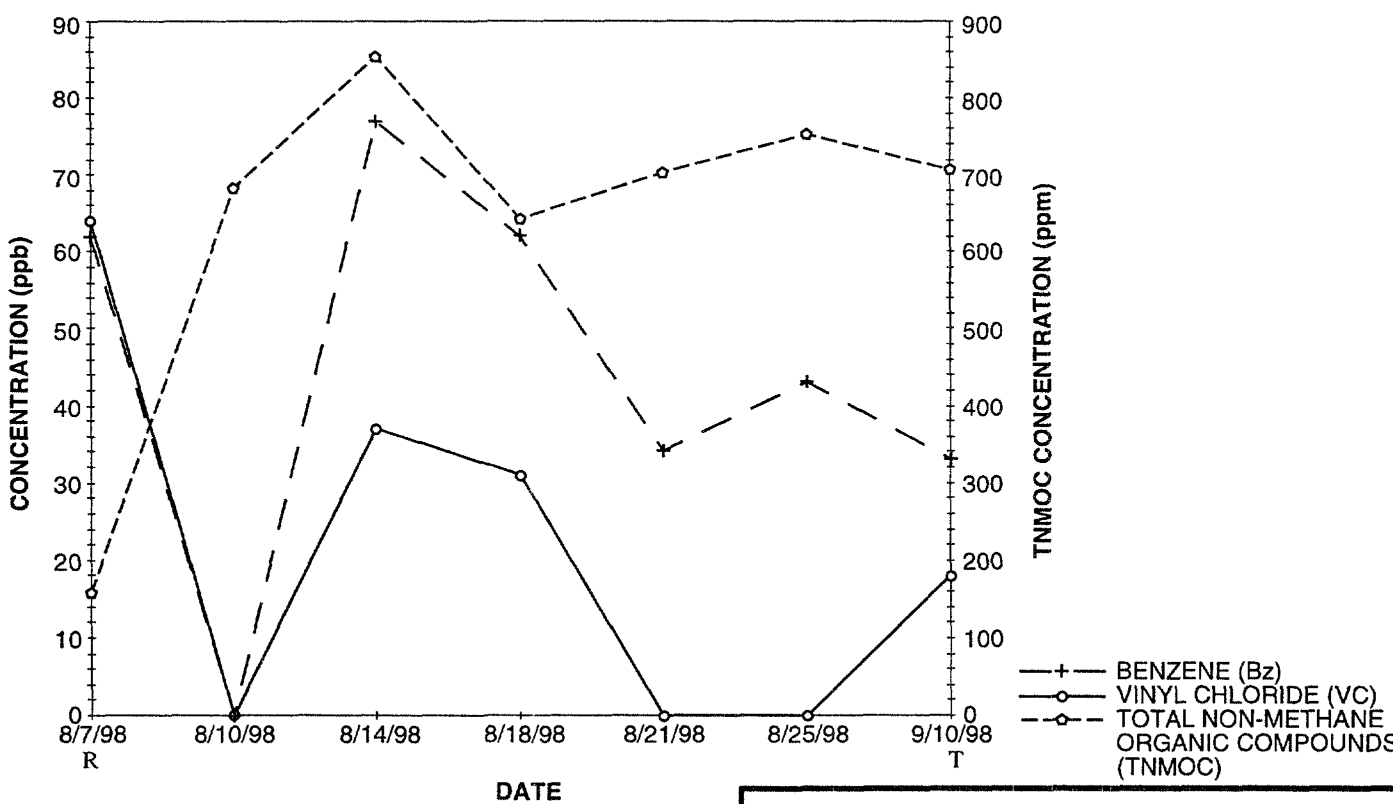
BROTHERS SVE TEST AREA
ZONE OF INFLUENCE
DEEP MONITORING WELL
SOIL GAS RESULTS

WASTE DISPOSAL, INC.
SANTA FE SPRINGS, CALIFORNIA

TRC

FIGURE 3.15





LEGEND

R = RECOVERY MONITORING INITIATED

T = RECOVERY MONITORING TERMINATED AND FIELD MONITORING USING EPA PURGING PROCEDURE INITIATED.

NOTES:
(1) PRIOR TO EPA PURGING PROCEDURE.
(2) EXTRACTION WELL DATA ONLY.

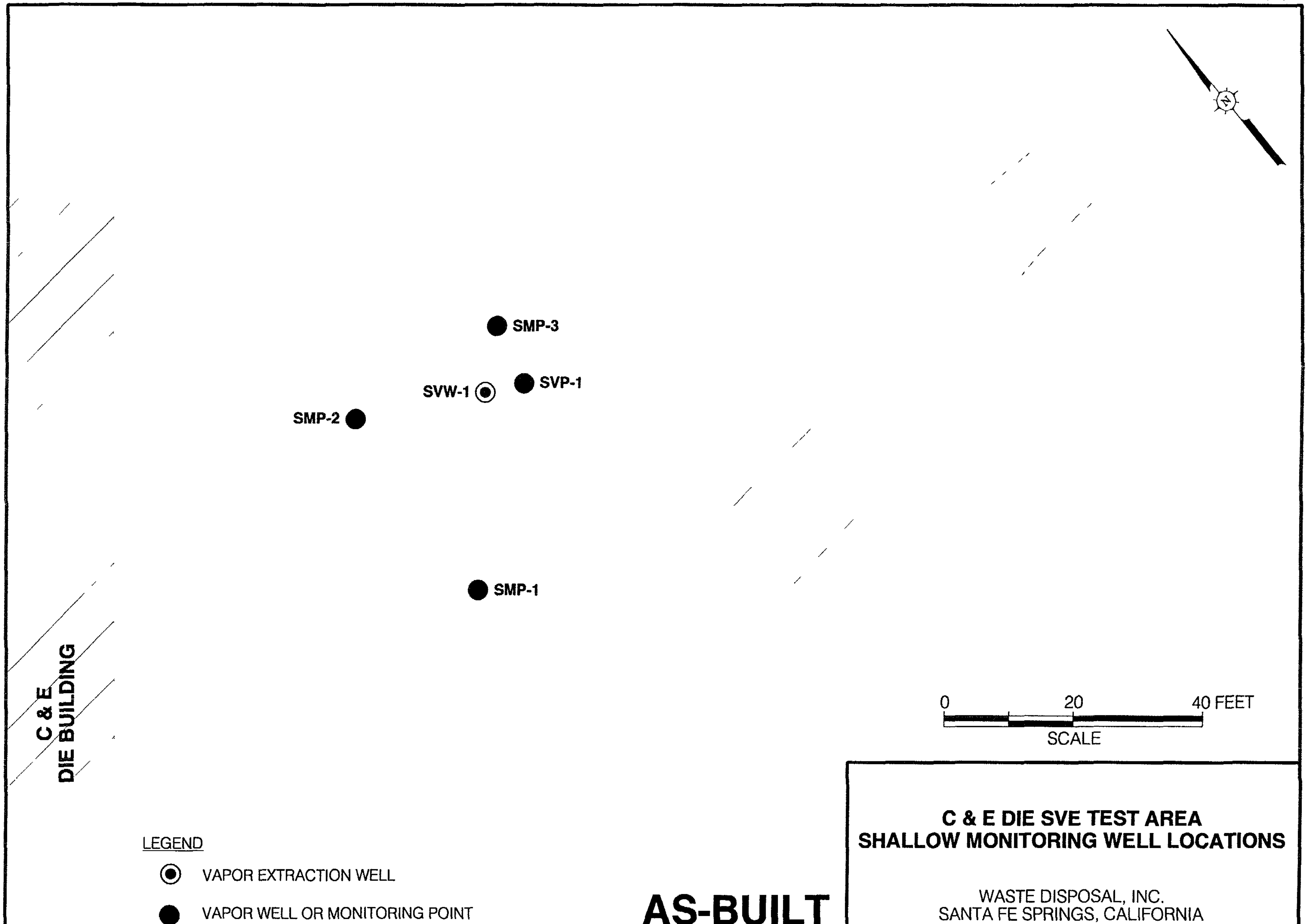
BROTHERS DEEP ZONE SVE TESTING LABORATORY RESULTS DURING RECOVERY PERIOD (1)(2)

WASTE DISPOSAL, INC.
SANTA FE SPRINGS, CALIFORNIA

TRC

FIGURE 3.16

94-256TM9AROF-53 REV 02/26/99



REFERENCE NUNEZ ENGINEERING, SURVEY DRAWING NE 97187, OCT 31, 1997.

C & E DIE SVE TEST AREA
SHALLOW MONITORING WELL LOCATIONS

WASTE DISPOSAL, INC.
SANTA FE SPRINGS, CALIFORNIA

TRC

FIGURE 3.17

SMP-2

	9/10/98	10/19/98 (1)	11/05/98 (1)	11/19/98 (1)	12/15/98 (1)	1/18/99 (1)
CH_4	0 0	0 0	0 0 [40]	0 0 [130]	0 0	0 0
CO_2	10 7	0 6	0 8	1 2	1 1	0 9
O_2	6 4	20 0	20 4	19 8	18 6	19 7

SMP-3

	9/10/98	10/19/98 (1)	11/05/98 (1)	11/19/98 (1)	12/15/98 (1)	1/18/99 (1)
CH_4	0 0	0 0	0 0 [50]	0 0 [63]	0 0 [55]	0 0
CO_2	7 7	0 3	0 4	0 4	0 3	1 2
O_2	9 9	19 8	19 4	18 7	17 7	18 6

SVP-1

	9/10/98	10/09/98 (1)	11/05/98 (1)	11/19/98 (1)	12/15/98 (1)	1/18/99 (1)
CH_4	NM	0 0	0 0 [0]	0 0 [170]	0 0 [150]	0 0
CO_2	NM	1 3	0 9	1 0	0 9	5 1
O_2	NM	19 4	20 2	19 6	18 6	13 0

SVW-1

	INITIAL 7/21/98	9/10/98	10/09/98 (1)	11/05/98 (1)	11/19/98 (1)	12/15/98 (1)	1/18/99 (1)
CH_4	0 2	--	0 0	0 0 [10]	0 0 [53]	0 0 [44]	0 0
CO_2	5 7	-	1 6	2 6	7 2	7 0	7 9
O_2	12 6	-	18 7	17 7	10 2	11 2	4 3

SMP-1

	9/10/98	10/19/98 (1)	11/05/98 (1)	11/19/98 (1)	12/15/98 (1)	1/18/99 (1)
CH_4	0 0	0 0	25 1	25 8	26 7	49 0
CO_2	6 8	7 9	5 3	5 8	9 6	4 2
O_2	11 5	10 2	3 0	0 5	0 2	0 0

C & E
DIE BUILDING

LEGEND

NM NOT MEASURED

VAPOR EXTRACTION WELL

VAPOR WELL OR MONITORING POINT

(1) RESULTS OBTAINED BY VACUUM PURGING ONE TO TWO WELL VOLUMES
[ ] = FID READING IN ppm CORRECTED FOR DILUTION

NOTE
INITIAL READINGS WERE COLLECTED PRIOR TO SVE TREATMENT
CH_4, CO_2 AND O_2 READINGS ARE RECORDED AS PERCENT CONCENTRATIONS
SVE WELLS ARE LOCATED WITHIN FOOTPRINT OF THE SUMP-LIKE MATERIAL REFER TO FIGURE 2 1

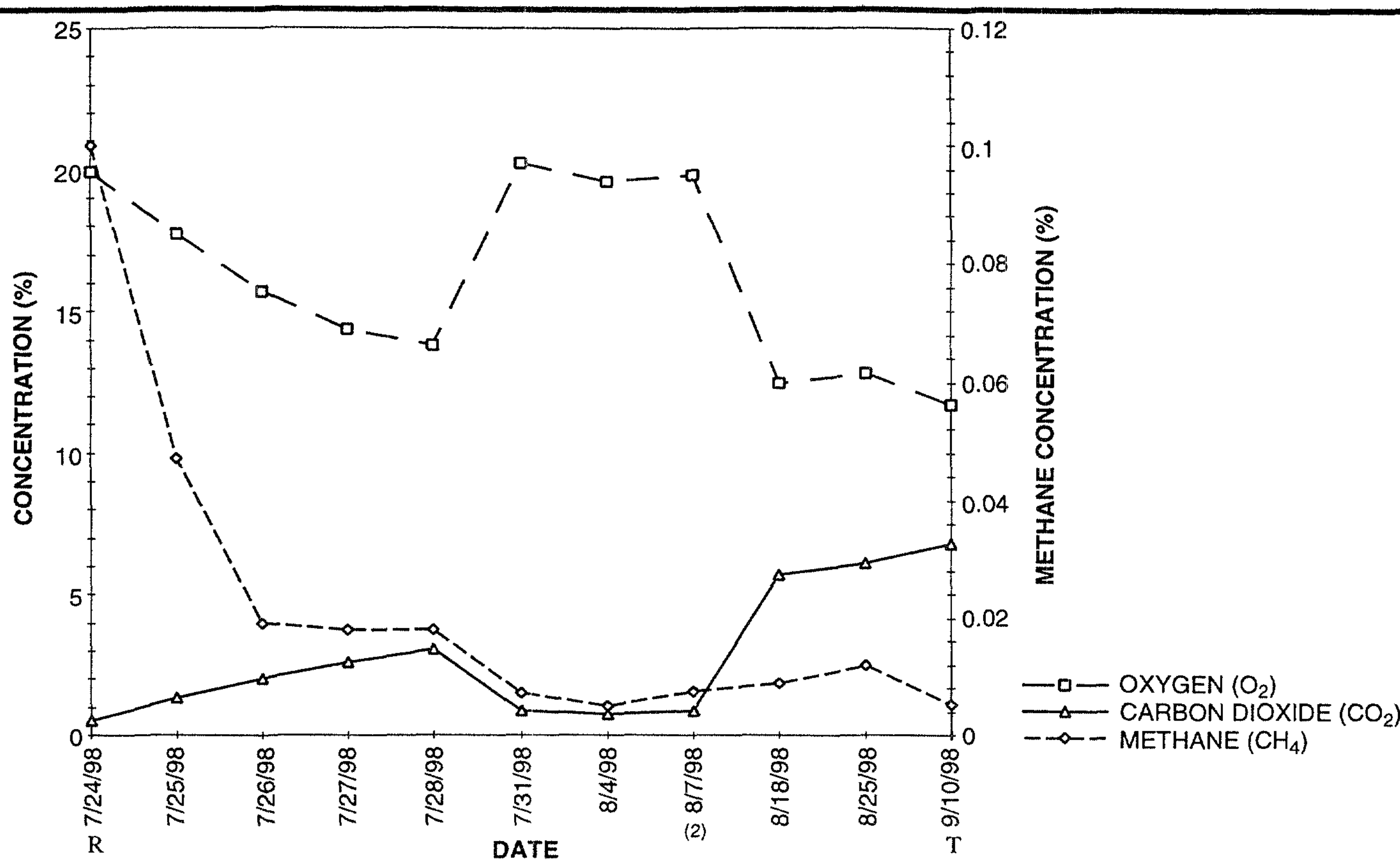
0 20 40 FEET
SCALE

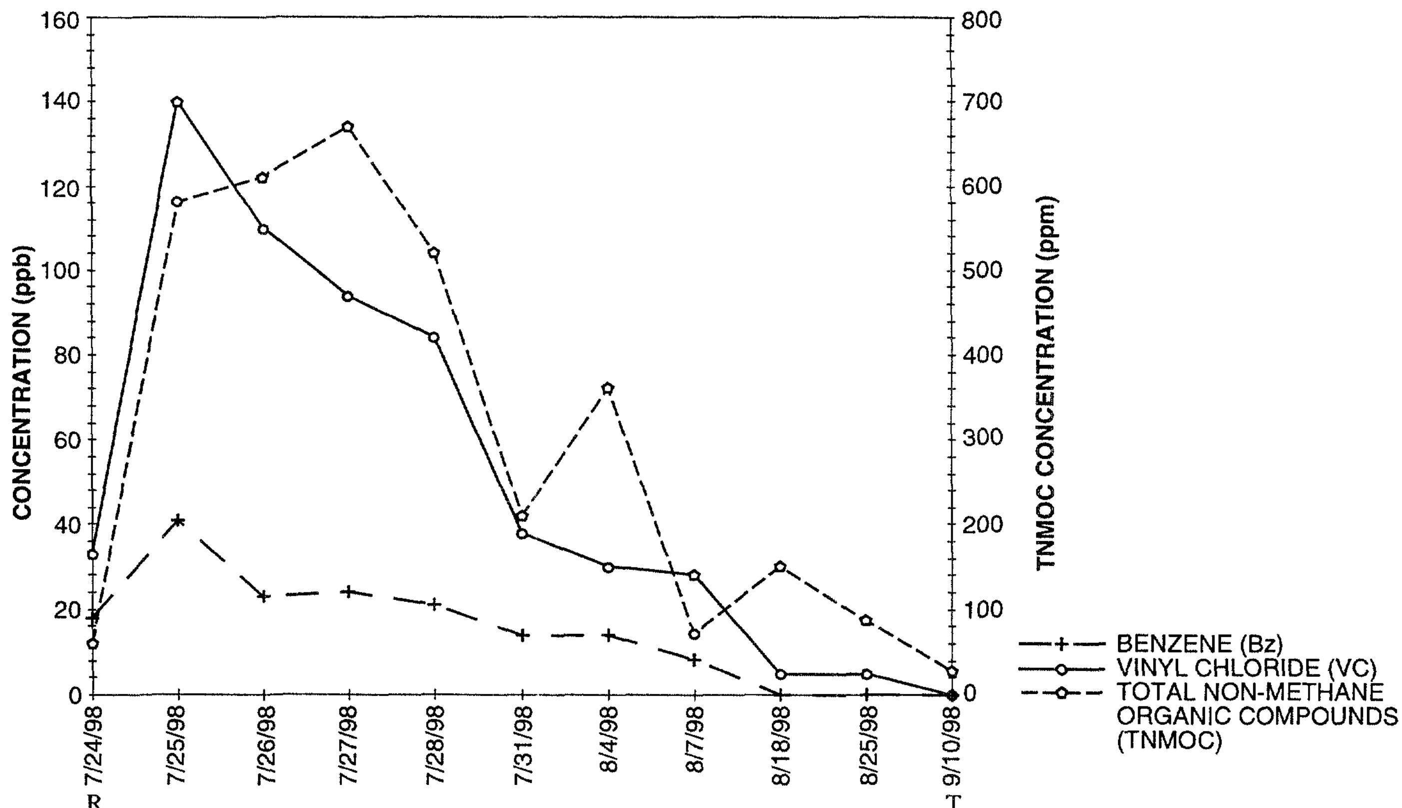
C & E DIE SVE TEST AREA
ZONE OF INFLUENCE
SHALLOW MONITORING WELL
SOIL GAS RESULTS

WASTE DISPOSAL, INC
SANTA FE SPRINGS, CALIFORNIA

TRC

FIGURE 3.18





LEGEND

R = RECOVERY MONITORING INITIATED

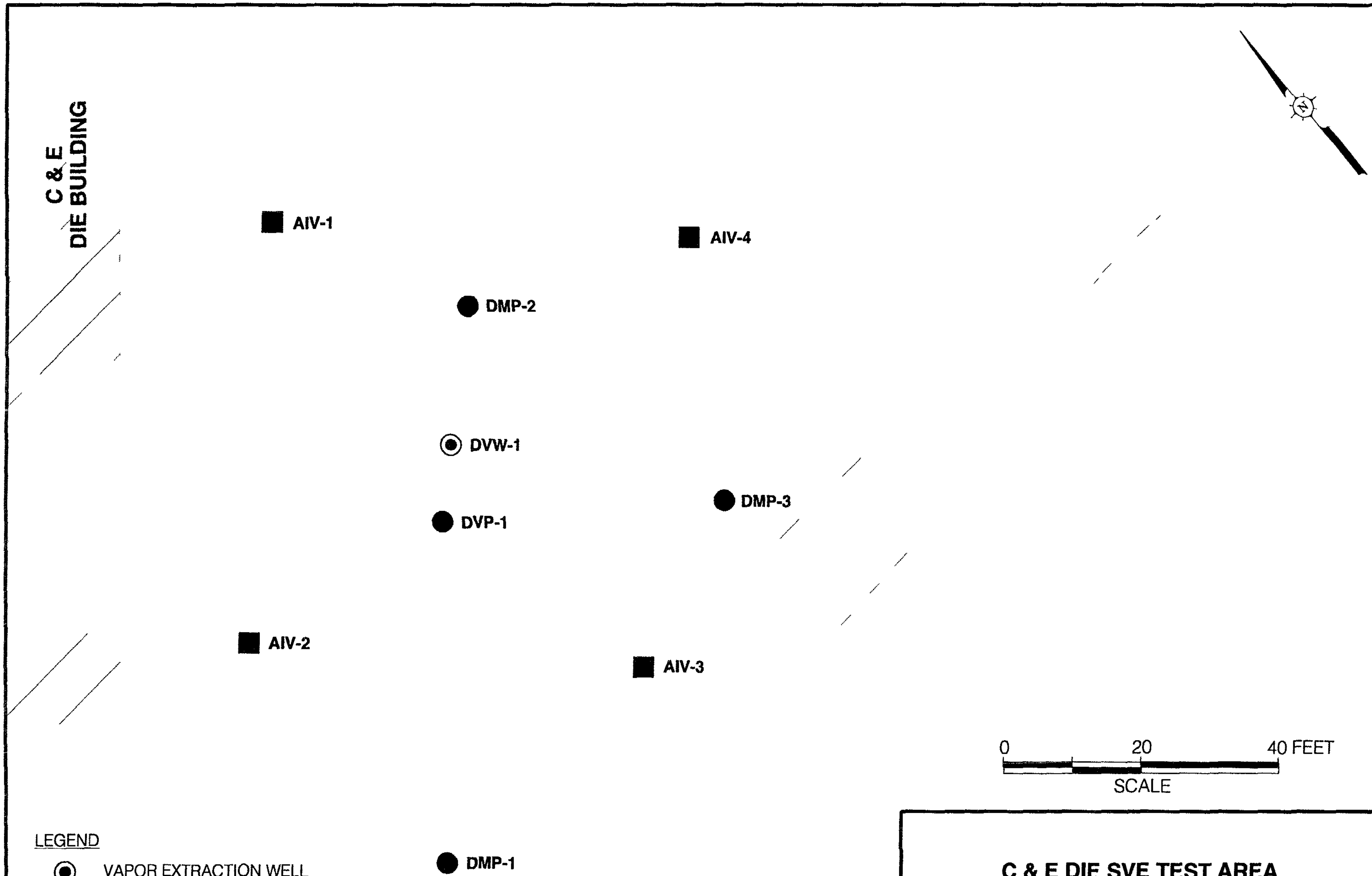
T = RECOVERY MONITORING TERMINATED AND FIELD MONITORING USING EPA PURGING PROCEDURE INITIATED.

NOTES:
(1) PRIOR TO EPA PURGING PROCEDURE.
(2) CO_2 GRADUALLY INCREASES AND 0_2 DECREASES WHICH IS CONSISTENT WITH BIOLOGICAL DEGRADATION.
(3) EXTRACTION WELL DATA ONLY.

C&E DIE SHALLOW ZONE SVE TESTING LABORATORY RESULTS DURING RECOVERY PERIOD (1)(3)

WASTE DISPOSAL, INC.
SANTA FE SPRINGS, CALIFORNIA

TRC | **FIGURE 3.19**



LEGEND

VAPOR EXTRACTION WELL

VAPOR WELL OR MONITORING POINT

AIR INJECTION WELL

AS-BUILT

C & E DIE SVE TEST AREA
DEEP MONITORING WELL LOCATIONS

WASTE DISPOSAL, INC
SANTA FE SPRINGS, CALIFORNIA

TRC | **FIGURE 3.20**

REFERENCE NUNEZ ENGINEERING SURVEY DRAWING NE 97187 OCT 31 1997

94-256TM9AROF-63 REV 02/26/99

C & E DIE BUILDING

AIV-1

	9/10/98	10/19/98 (2)	11/05/98 (2)	11/19/98 (2)	12/16/98 (2)	1/18/99 (2)
CH_4	0.3	0.2	0.6	0.7	0.6	0.0
CO_2	6.1	15.1	17.0	17.5	17.2	1.4
O_2	6.8	0.0	0.0	0.0	0.0	18.3

DMP-2

	9/10/98	10/19/98 (2)	11/05/98 (2)	11/19/98 (2)	12/16/98 (2)	1/18/99 (2)
CH_4	0.6	1.3	1.7	1.6	1.5	2.0
CO_2	2.2	15.5	17.3	18.2	17.6	18.5
O_2	14.4	0.0	0.6	0.0	0.0	0.0

AIV-4

	9/10/98	10/19/98 (2)	11/05/98 (2)	11/19/98 (2)	12/16/98 (2)	1/18/99 (2)
CH_4	0.0	1.0	13.8	3.3	3.3	3.3
CO_2	0.3	15.5	17.2	18.2	17.4	18.5
O_2	19.0	0.0	0.0	0.0	0.0	0.0

DVW-1

	INITIAL 7/27/98	9/10/98 (1)	10/09/98 (2)	11/05/98 (2)	11/19/98 (2)	12/16/98 (2)	1/18/99 (2)
CH_4	2.7	0.0	0.4	0.6	0.6	0.6	1.6
CO_2	4.5	3.8	15.0	16.6	17.8	16.8	18.7
O_2	13.3	13.4	0.0	0.0	0.0	0.0	0.0

DVP-1

	9/10/98	10/09/98 (2)	11/05/98 (2)	11/19/98 (2)	12/16/98 (2)	1/18/99 (2)
CH_4	0.0	0.0	0.1	0.0 [240]	0.0 [180]	0.5
CO_2	0.2	13.5	15.9	15.4	15.2	10.2
O_2	20.3	0.3	0.0	1.5	1.1	8.3

DMP-3

	9/10/98	10/19/98 (2)	11/05/98 (2)	11/19/98 (2)	12/16/98 (2)	1/18/99 (2)
CH_4	0.4	1.4	1.9	1.7	1.6	2.2
CO_2	6.9	15.8	16.8	18.6	18.4	18.9
O_2	8.2	0.0	0.3	0.0	8.0	0.0

AIV-2

	9/10/98	10/19/98(2)	11/05/98(2)	11/19/98 (2)	12/16/98(2)	1/18/99 (2)
CH_4	0.2	0.5	0.6	0.5	0.6	0.5
CO_2	6.3	16.7	18.4	19.3	18.7	19.2
O_2	6.2	0.0	0.0	0.0	0.0	0.0

AIV-3

	9/10/98	10/19/98 (2)	11/05/98 (2)	11/19/98 (2)	12/16/98 (2)	1/18/99 (2)
CH_4	0.0	0.6	1.0	1.0	1.0	1.4
CO_2	1.8	15.4	17.2	18.4	17.7	18.8
O_2	16.1	0.0	0.0	0.0	0.0	0.0

DMP-1

	9/10/98	10/19/98 (2)	11/05/98 (2)	11/19/98 (2)	12/16/98 (2)	1/18/99 (3)
CH_4	0.0	0.1	(3)	0.1	0.1	
CO_2	0.3	17.1	(3)	13.2	14.6	
O_2	19.6	0.0	(3)	2.7	1.4	

0 20 40 FEET

SCALE

LEGEND

VAPOR EXTRACTION WELL

VAPOR WELL OR MONITORING POINT

AIR INJECTION WELL

(1) REPORTED AS PART OF RECOVERY MONITORING PROGRAM.
(2) RESULTS OBTAINED BY VACUUM PURGING ONE TO TWO WELL VOLUMES.
(3) WELL DAMAGED DURING SITE GRADING.

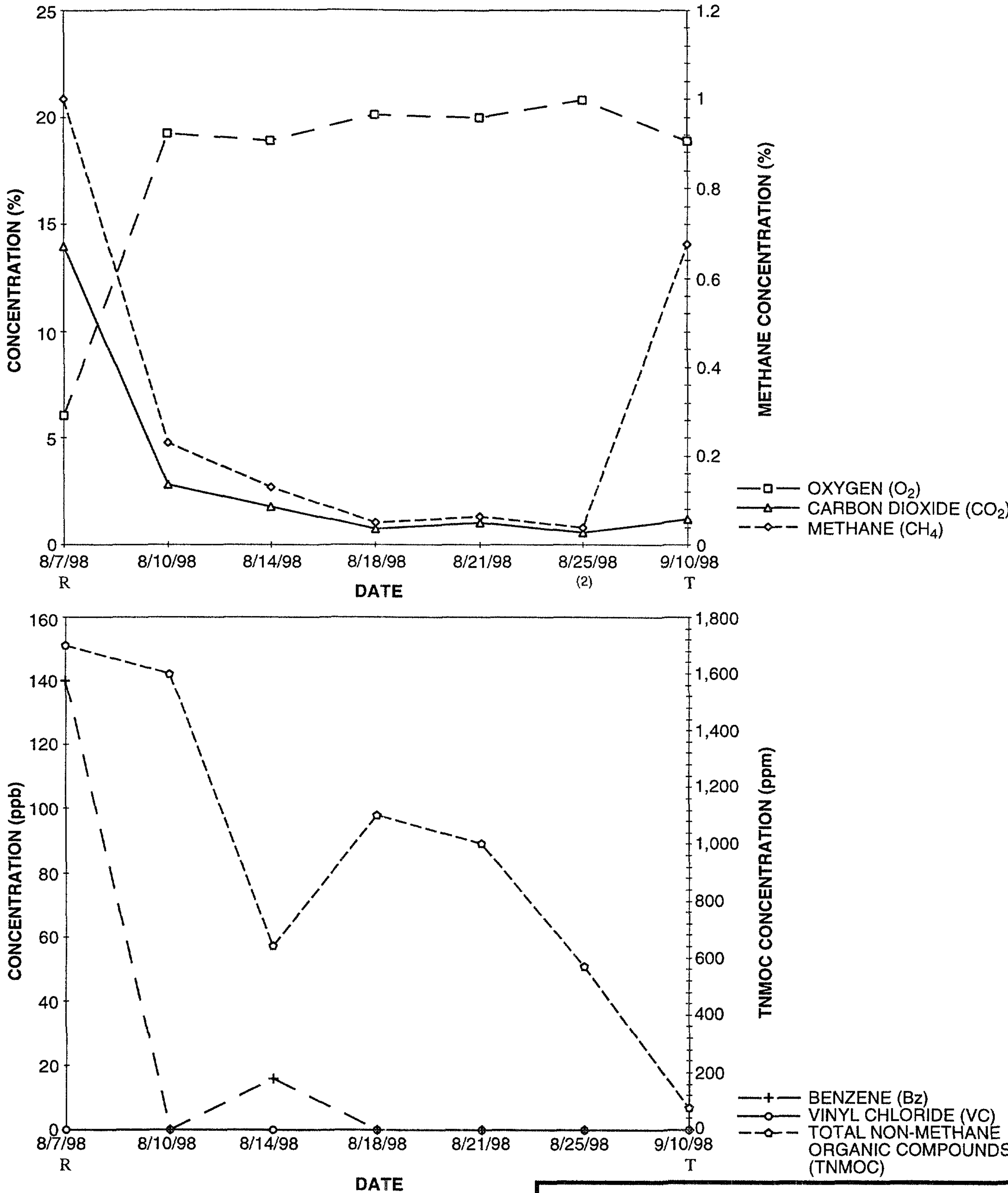
NOTE:
INITIAL READINGS WERE COLLECTED PRIOR TO SVE TREATMENT.
CH_4, CO_2, AND O_2 READINGS ARE RECORDED AS PERCENT CONCENTRATIONS.
SVE WELLS ARE LOCATED WITHIN FOOTPRINT OF THE SUMP-LIKE MATERIAL. REFER TO FIGURE 2.1.

C & E DIE SVE TEST AREA
ZONE OF INFLUENCE
DEEP MONITORING WELL
SOIL GAS RESULTS

WASTE DISPOSAL, INC.
SANTA FE SPRINGS, CALIFORNIA

TRC

FIGURE 3.21



LEGEND

R = RECOVERY MONITORING INITIATED

T = RECOVERY MONITORING TERMINATED AND FIELD MONITORING USING EPA PURGING PROCEDURE INITIATED.

NOTES:
(1) PRIOR TO EPA PURGING PROCEDURE.
(2) METHANE LEVELS APPEAR TO INCREASE EVEN WITH HIGH 0_2 LEVELS.
(3) EXTRACTION WELL DATA ONLY.

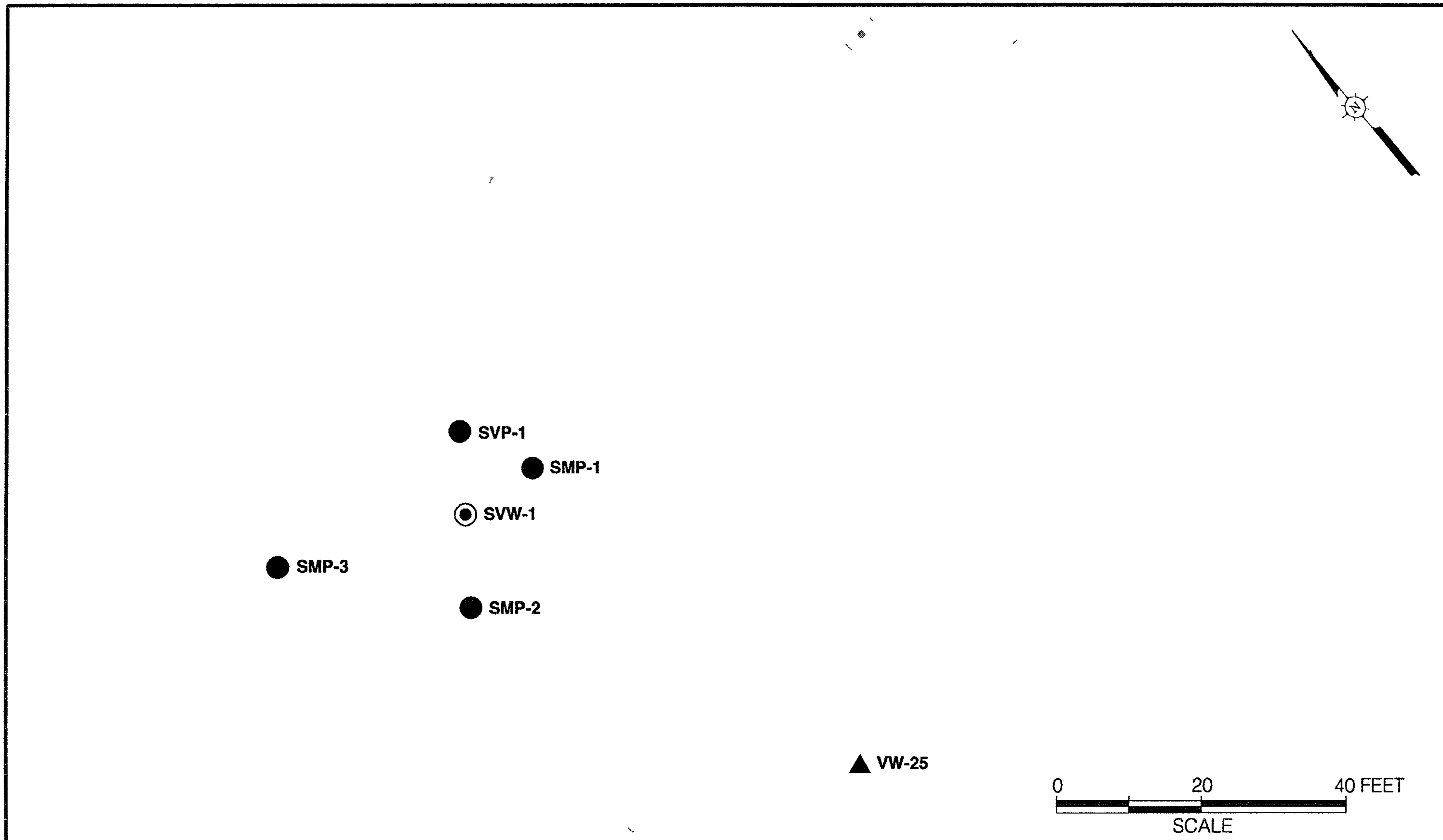
C&E DIE DEEP ZONE SVE TESTING LABORATORY RESULTS DURING RECOVERY PERIOD (1)(3)

WASTE DISPOSAL, INC.
SANTA FE SPRINGS, CALIFORNIA

TRC

FIGURE 3.22

94-256TM9AROF-55 REV 02/26/99



LEGEND

- VAPOR EXTRACTION WELL
- VAPOR WELL OR MONITORING POINT
- EXISTING VAPOR WELL

AS-BUILT

AREA 7 SVE TEST AREA
SHALLOW MONITORING WELL LOCATIONS

WASTE DISPOSAL, INC.
SANTA FE SPRINGS, CALIFORNIA

TRC	FIGURE 3.23

REFERENCE NUNEZ ENGINEERING, SURVEY DRAWING NE 97187, OCT 31, 1997.

94-256TM9AROF-64 REV 02/26/99

SVW-1

	INITIAL 8/7/98	9/10/98	10/09/98 (1)	11/04/98 (1)	11/19/98 (1)	12/15/98 (1)	1/18/99 (1)
CH_4	0 4	--	0.0	0.2	0.1 [560]	0.1 [540]	0.0
CO_2	10.0	--	9.1	8.5	7.9	7.7	6.1
O_2	0.0	NA	0.0	0.1	0.0	0.0	0.0

SVP-1

	9/10/98	10/12/98 (1)	11/04/98 (1)	11/19/98 (1)	12/15/98 (1)	1/18/99 (1)
CH_4	0.0	0.0	0.3	0.1 [580]	0.1 [440]	0 1
CO_2	11.8	7.3	5.8	6.1	6.4	4.5
O_2	0.4	0.0	3.1	0.8	0.8	0.3

SMP-1

	9/10/98	10/09/98 (1)	11/04/98 (1)	11/19/98 (1)	12/15/98 (1)	1/18/99 (1)
CH_4	0.0	3.5	4.1	3.2	3.3	1 5
CO_2	9.0	7.5	7 5	6.9	6.8	5 9
O_2	0.2	0.0	0.0	0 0	0.0	0.0

SMP-2

	9/10/98	10/12/98 (1)	11/04/98 (1)	11/19/98 (1)	12/15/98 (1)	1/18/99 (1)
CH_4	0.0	0.0	0.0 [13]	0.0 [5.2]	0.0 [10.6]	0.0
CO_2	9.3	5 2	5 0	3 9	3.8	3.1
O_2	0.7	11.3	11.7	13 4	12.9	13.7

SMP-3

	9/10/98	10/12/98 (1)	11/04/98 (1)	11/19/98 (1)	12/15/98 (1)	1/20/99 (1)
CH_4	0 1	0.0	0.0 [25]	0.0 [69]	0.0 [55]	0 0
CO_2	4.6	0.9	3.9	0.0	0.0	0.8
O_2	0 6	6.7	4.8	19.5	16.3	14.9

VW-25

	9/10/98	11/19/98 (1)	12/15/98 (1)	2/1/99 (1)
CH_4	0.7	0 5	0.4	14.5
CO_2	11.6	12.4	11 9	12.4
O_2	20.4	16.6	12.4	3.2

0 20 40 FEET

SCALE

LEGEND

- VAPOR EXTRACTION WELL
- VAPOR WELL OR MONITORING POINT
- EXISTING VAPOR WELL

(1) RESULTS OBTAINED BY VACUUM PURGING ONE TO TWO WELL VOLUMES.
[ ] = FID READING IN ppm CORRECTED FOR DILUTION.

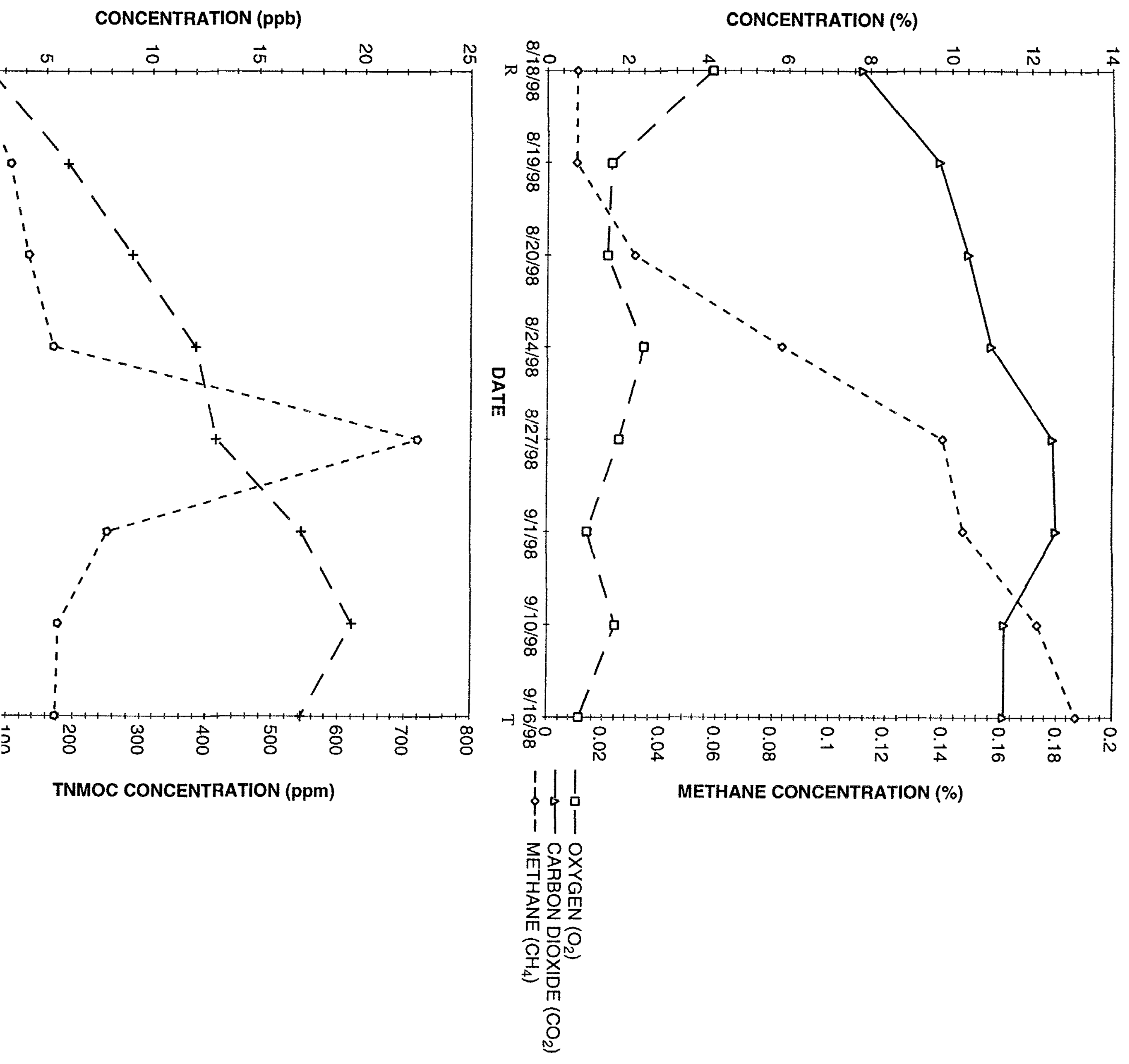
NOTE:
INITIAL READINGS WERE COLLECTED PRIOR TO SVE TREATMENT.
CH_4, CO_2, AND O_2 READINGS ARE RECORDED AS PERCENT CONCENTRATIONS.
SVE WELLS ARE LOCATED WITHIN FOOTPRINT OF THE SUMP-LIKE MATERIAL. REFER TO FIGURE 2.1.

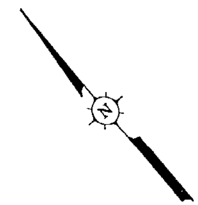
AREA 7 SVE TEST AREA ZONE OF INFLUENCE SHALLOW MONITORING WELL SOIL GAS RESULTS

WASTE DISPOSAL, INC.
SANTA FE SPRINGS, CALIFORNIA

TRC

FIGURE 3.24





END
VAPOR EXTRACTION WELL
VAPOR WELL OR MONITORING POINT
AIR INJECTION WELL
EXISTING VAPOR WELL

20
40 FEET
SCALE

\ 7 SVE TEST AREA
TORING WELL LOCATIONS

\STE DISPOSAL, INC.
FE SPRINGS, CALIFORNIA

FIGURE 3.26

94-256TM9AROF-65 REV 02/26/99

DMP-2

	9/10/98	10/12/98 (1)	11/04/98 (1)	11/19/98 (1)	12/16/98 (1)	1/18/99 (1)
CH_4	0.0	0.0	0.2	0.2	0.2	0.2
CO_2	1.2	11.2	12.9	13.7	14.6	14.0
O_2	14.9	0.0	0.1	0.0	0.0	0.0

AIV-3

	9/10/98	10/12/98 (1)	11/04/98 (1)	11/19/98 (1)	12/16/98 (1)	1/18/99 (1)
CH_4	0.0	0.0	0.2	0.3	0 2	0.2
CO_2	0.9	8.8	10.9	11.5	10.8	13.1
O_2	15.6	0.0	0.0	0.0	0.0	0.0

DVW-1

	INITIAL 8/11/98	9/10/98	10/09/98 (1)	11/04/98 (1)	11/19/98 (1)	12/16/98 (1)	1/18/99 (1)
CH_4	0.0	0.0	0.2	0.6	0.6	0.5	0.9
CO_2	0.0	1.3	10.0	12.1	12.7	12.4	13.6
O_2	20.9	16.2	0.0	0.0	0.0	0 0	0.0

DMP-1

	9/10/98	10/09/98(1)	11/04/98(1)	11/19/98 (1)	12/16/98 (1)	1/18/99 (1)
CH_4	0.0	0.0	0 5	0.4	0.4	1.2
CO_2	1.0	1.3	10 7	11.1	10.8	13.0
O_2	15.7	17.5	0.4	0.9	1.1	0.0

AIV-2

	9/10/98	10/12/98 (1)	11/04/98 (1)	11/19/98 (1)	12/16/98 (1)	1/18/99 (1)
CH_4	0 1	0.0	0.3	0.2	0.2	0.1
CO_2	1.1	12.1	14.2	14.8	14.9	15.3
O_2	16.0	0.0	0.0	0.0	0.1	0.0

AIV-4

	9/10/98	10/12/98 (1)	11/04/98 (1)	11/19/98 (1)	12/16/98 (1)	1/18/99 (1)
CH_4	0.0	0.4	1.2	1.4	1.3	2.4
CO_2	1.0	11.4	12.6	12.7	12.0	13.6
O_2	16.6	0.0	0.0	0 2	0.4	0 0

VW-25

	9/10/98 (1)	11/19/98 (1)	12/16/98 (1)	2/1/99 (1)
CH_4	0.7	0.5	0.6	14.5
CO_2	11.6	12.4	11.9	12.4
O_2	20.4	16.6	15.3	3.2

DVP-1

	9/10/98	10/12/98 (1)	11/04/98 (1)	11/19/98 (1)	12/16/98 (1)	1/18/99 (1)
CH_4	0 0	0.0	0 5	0 5	0 6	0 5
CO_2	1.4	11.3	12.7	13.5	14.2	14.0
O_2	16.0	0.0	0.0	0.0	0 0	0.0

DMP-3

	9/10/98	10/12/98 (1)	11/04/98 (1)	11/19/98 (1)	12/16/98 (1)	1/18/99 (1)
CH_4	0.1	0.0	0.0 [15]	0.0 [55]	0.0 [48]	0.0
CO_2	1.2	10.7	12.3	11.8	11.9	13.4
O^2	14 9	4 2	3.6	4.6	4.3	1.7

AIV-1

	9/10/98	10/12/98 (1)	11/04/98 (1)	11/19/98 (1)	12/16/98 (1)	1/18/99 (1)
CH_4	0.0	0 0	0.2	0.2	0.2	0.0
CO_2	1.1	2.2	9.8	10.5	9.9	9.9
O_2	16.2	16.8	0.0	4.5	4.3	3.9

LEGEND

- VAPOR EXTRACTION WELL
- VAPOR WELL OR MONITORING POINT
- AIR INJECTION WELL
- EXISTING VAPOR WELL

0 20 40 FEET

SCALE

(1) RESULTS OBTAINED BY VACUUM PURGING ONE TO TWO WELL VOLUMES.

[ ] FID READING IN ppm CORRECTED FOR DILUTION.

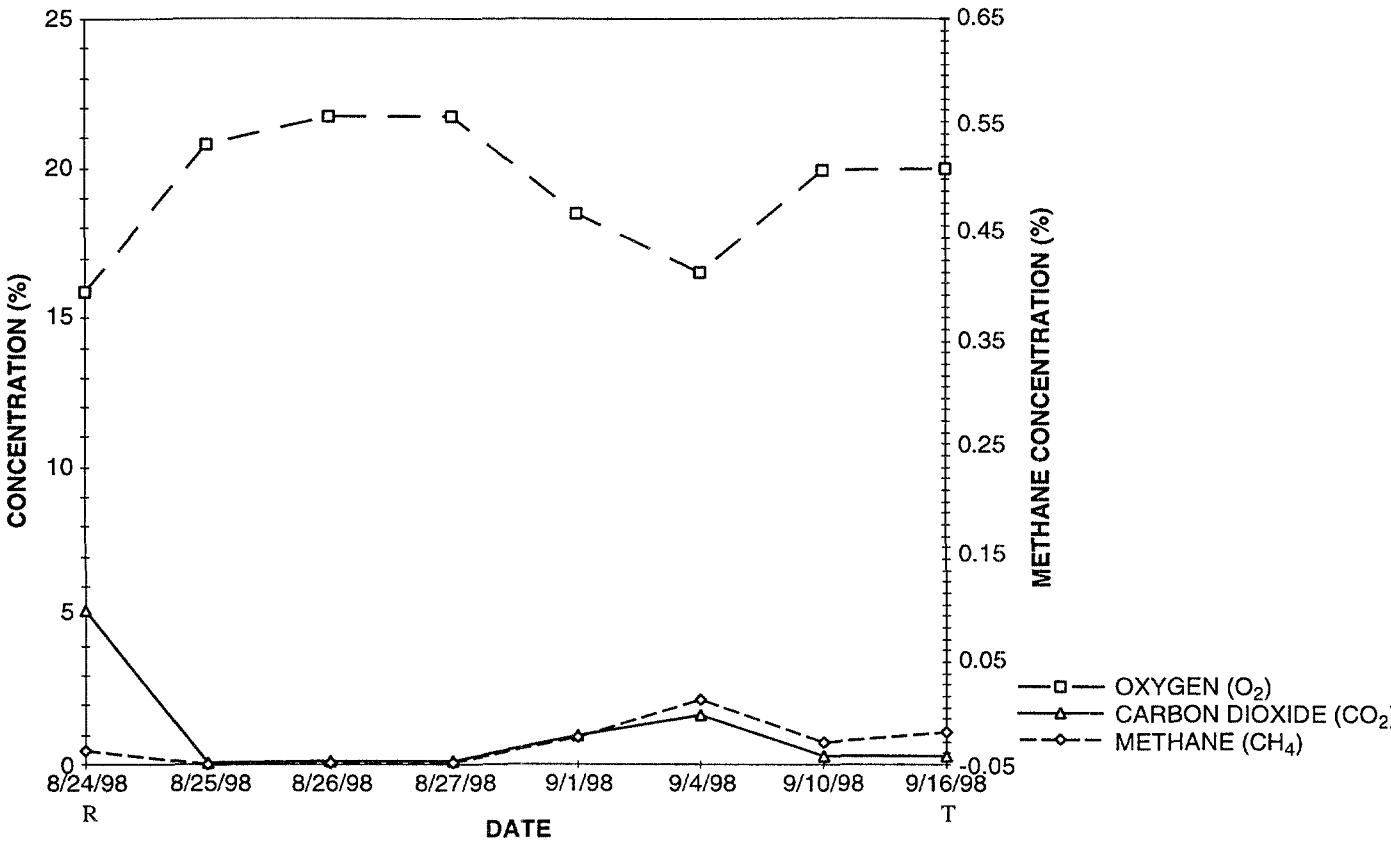
NOTE:
INITIAL READINGS WERE COLLECTED PRIOR TO SVE TREATMENT.
CH_4, CO_2, AND O_2 READINGS ARE RECORDED AS PERCENT CONCENTRATIONS.
SVE WELLS ARE LOCATED WITHIN FOOTPRINT OF THE SUMP-LIKE MATERIAL. REFER TO FIGURE 2.1.

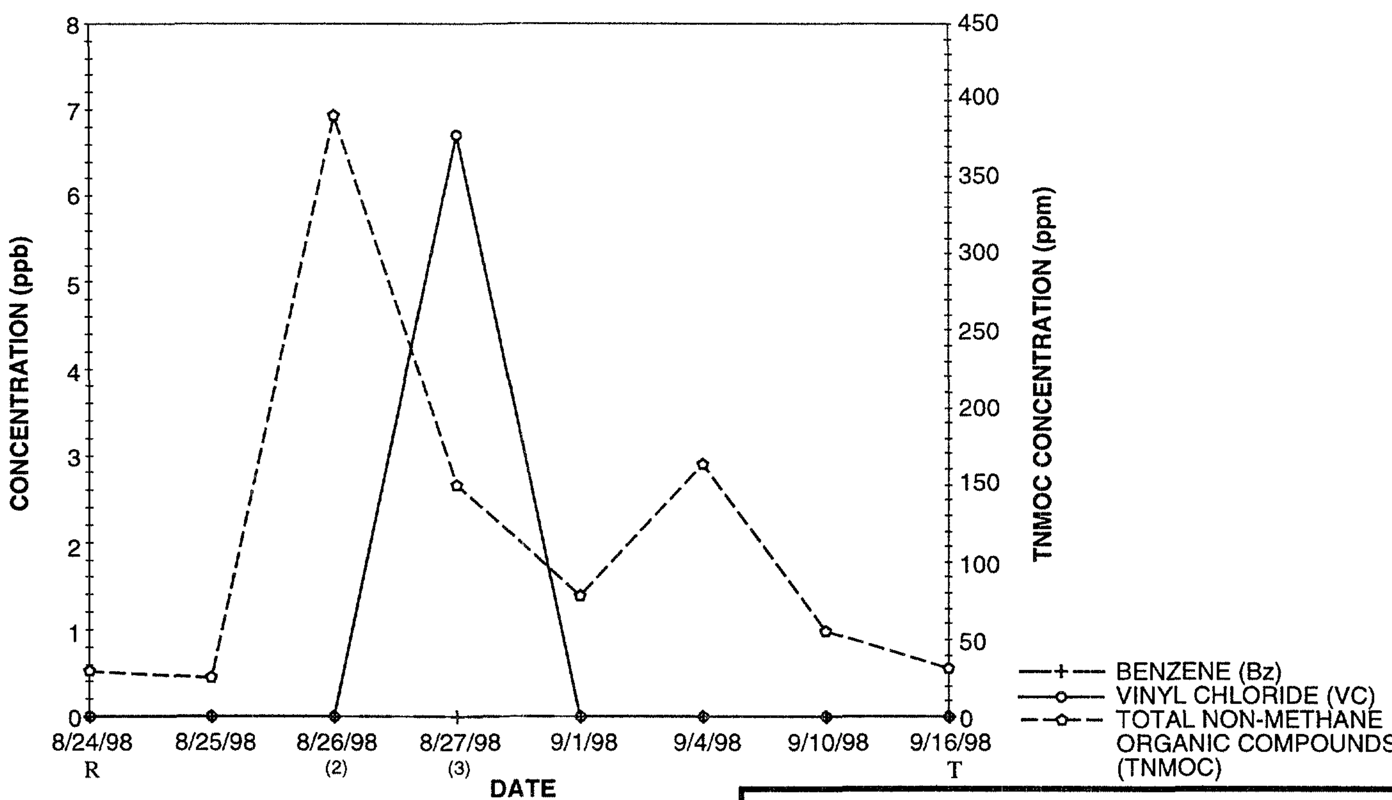
AREA 7 SVE TEST AREA ZONE OF INFLUENCE DEEP MONITORING WELL SOIL GAS RESULTS

WASTE DISPOSAL, INC.
SANTA FE SPRINGS, CALIFORNIA

TRC

FIGURE 3.27





LEGEND

R = RECOVERY MONITORING INITIATED

T = RECOVERY MONITORING TERMINATED AND FIELD MONITORING USING EPA PURGING PROCEDURE INITIATED.

NOTES:
(1) PRIOR TO EPA PURGING PROCEDURE.
(2) TNMOC INCREASE OBSERVED, NO CHANGES IN CONDITIONS.
(3) VC INCREASE OBSERVED, NO CHANGES IN CONDITIONS.
(4) EXTRACTION WELL DATA ONLY.

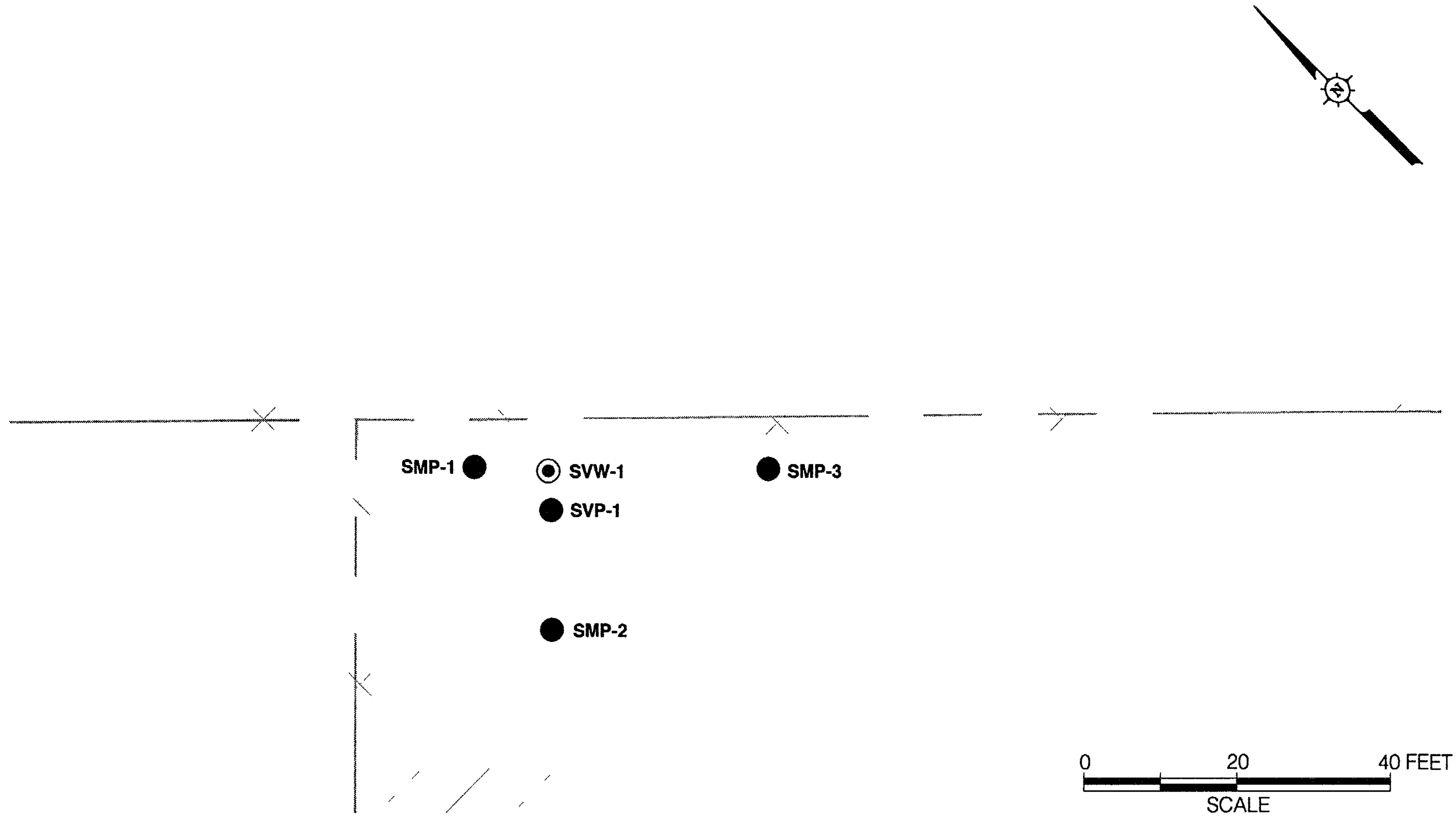
AREA 7 DEEP ZONE SVE TESTING LABORATORY RESULTS DURING RECOVERY PERIOD (1)(4)

WASTE DISPOSAL, INC.
SANTA FE SPRINGS, CALIFORNIA

TRC

FIGURE 3.28

94 256TM9AROF-57 REV 02/26/99



LEGEND

VAPOR EXTRACTION WELL

VAPOR WELL OR MONITORING POINT

AS-BUILT

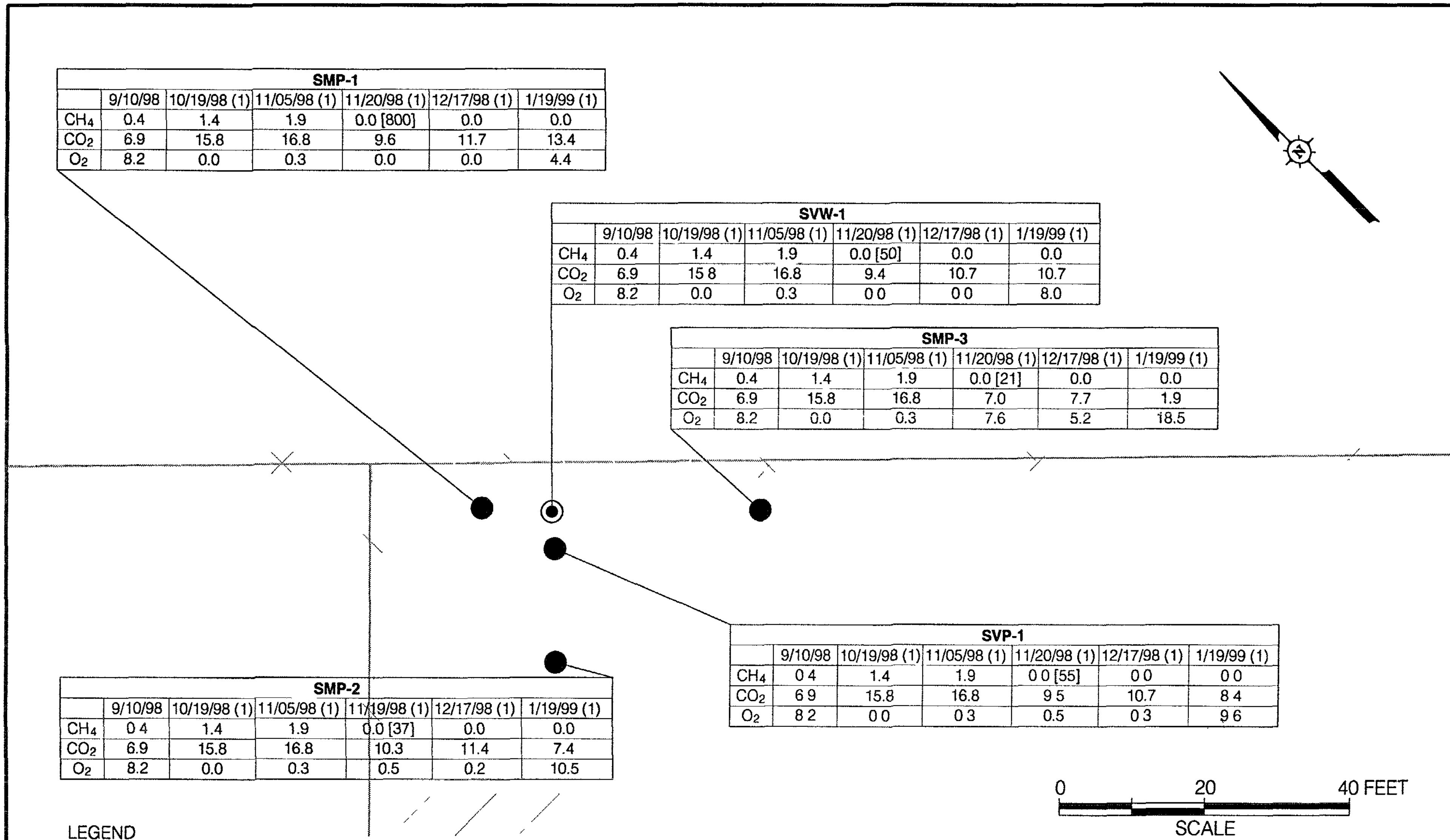
AREA 8 SVE TEST AREA
SHALLOW MONITORING WELL LOCATIONS

WASTE DISPLOSAL, INC.
SANTA FE SPRINGS, CALIFORNIA

TRC

FIGURE 3.29

REFERENCE NUNEZ ENGINEERING, SURVEY DRAWING NE 97187, OCT 31, 1997



SMP-1						
	9/10/98	10/19/98 (1)	11/05/98 (1)	11/20/98 (1)	12/17/98 (1)	1/19/99 (1)
CH_4	0.4	1.4	1.9	0.0 [800]	0.0	0.0
CO_2	6.9	15.8	16.8	9.6	11.7	13.4
O_2	8.2	0.0	0.3	0.0	0.0	4.4

SVW-1						
	9/10/98	10/19/98 (1)	11/05/98 (1)	11/20/98 (1)	12/17/98 (1)	1/19/99 (1)
CH_4	0.4	1.4	1.9	0.0 [50]	0.0	0.0
CO_2	6.9	15 8	16.8	9.4	10.7	10.7
O_2	8.2	0.0	0.3	0 0	0 0	8.0

SMP-3						
	9/10/98	10/19/98 (1)	11/05/98 (1)	11/20/98 (1)	12/17/98 (1)	1/19/99 (1)
CH_4	0.4	1.4	1.9	0.0 [21]	0.0	0.0
CO_2	6.9	15.8	16.8	7.0	7.7	1.9
O_2	8.2	0.0	0.3	7.6	5.2	18.5

SVP-1						
	9/10/98	10/19/98 (1)	11/05/98 (1)	11/20/98 (1)	12/17/98 (1)	1/19/99 (1)
CH_4	0 4	1.4	1.9	0 0 [55]	0 0	0 0
CO_2	6 9	15.8	16.8	9 5	10.7	8 4
O_2	8 2	0 0	0 3	0.5	0 3	9 6

SMP-2						
	9/10/98	10/19/98 (1)	11/05/98 (1)	11/19/98 (1)	12/17/98 (1)	1/19/99 (1)
CH_4	0 4	1.4	1.9	0.0 [37]	0.0	0.0
CO_2	6.9	15.8	16.8	10.3	11.4	7.4
O_2	8.2	0.0	0.3	0.5	0.2	10.5

0 20 40 FEET
SCALE

LEGEND

VAPOR EXTRACTION WELL

VAPOR WELL OR MONITORING POINT

(1) RESULTS OBTAINED BY VACUUM PURGING ONE TO TWO WELL VOLUMES.

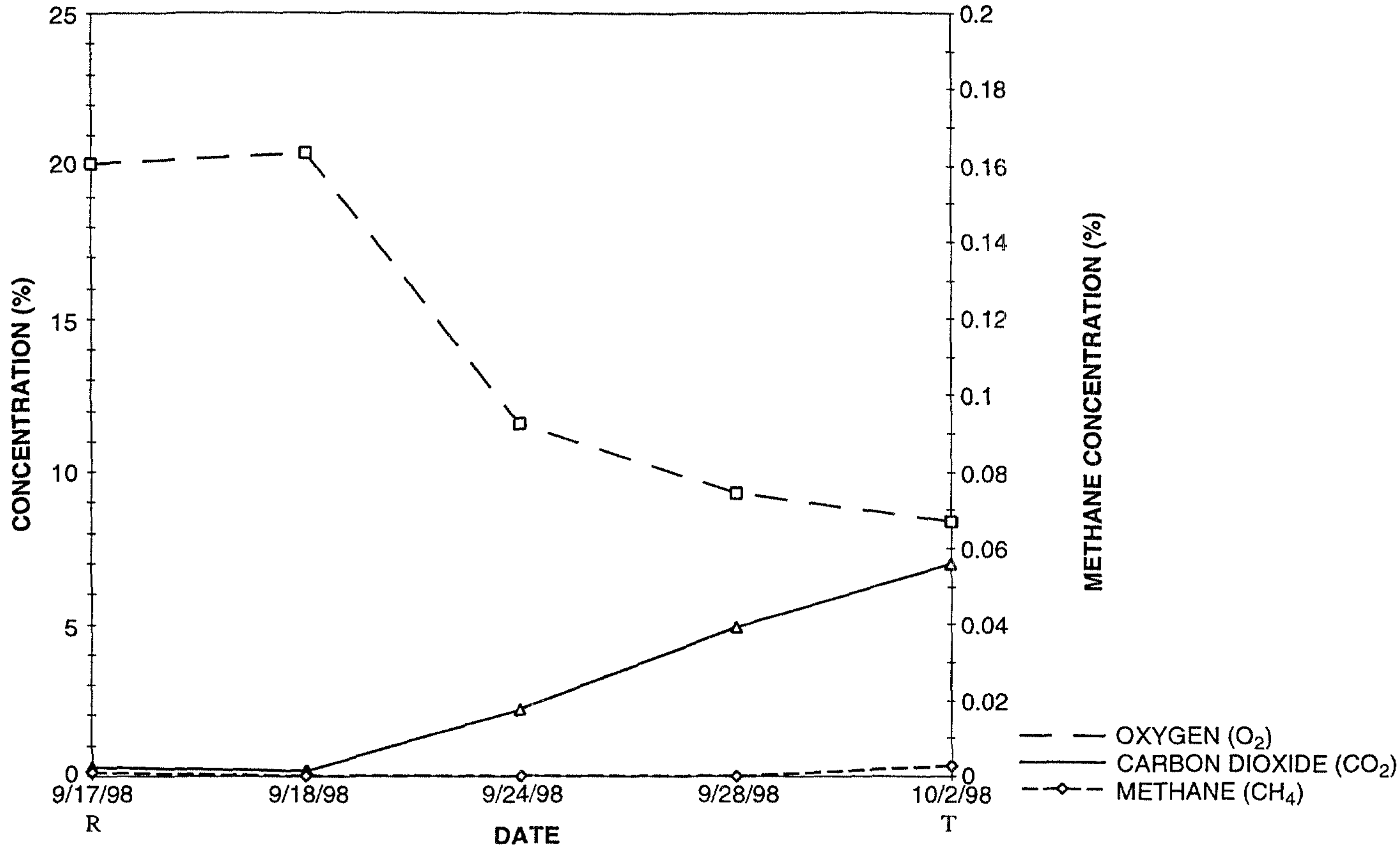
NOTE:
INITIAL READINGS WERE COLLECTED PRIOR TO SVE TREATMENT.
CH_4, CO_2, AND O_2, READINGS ARE RECORDED AS PERCENT CONCENTRATIONS.

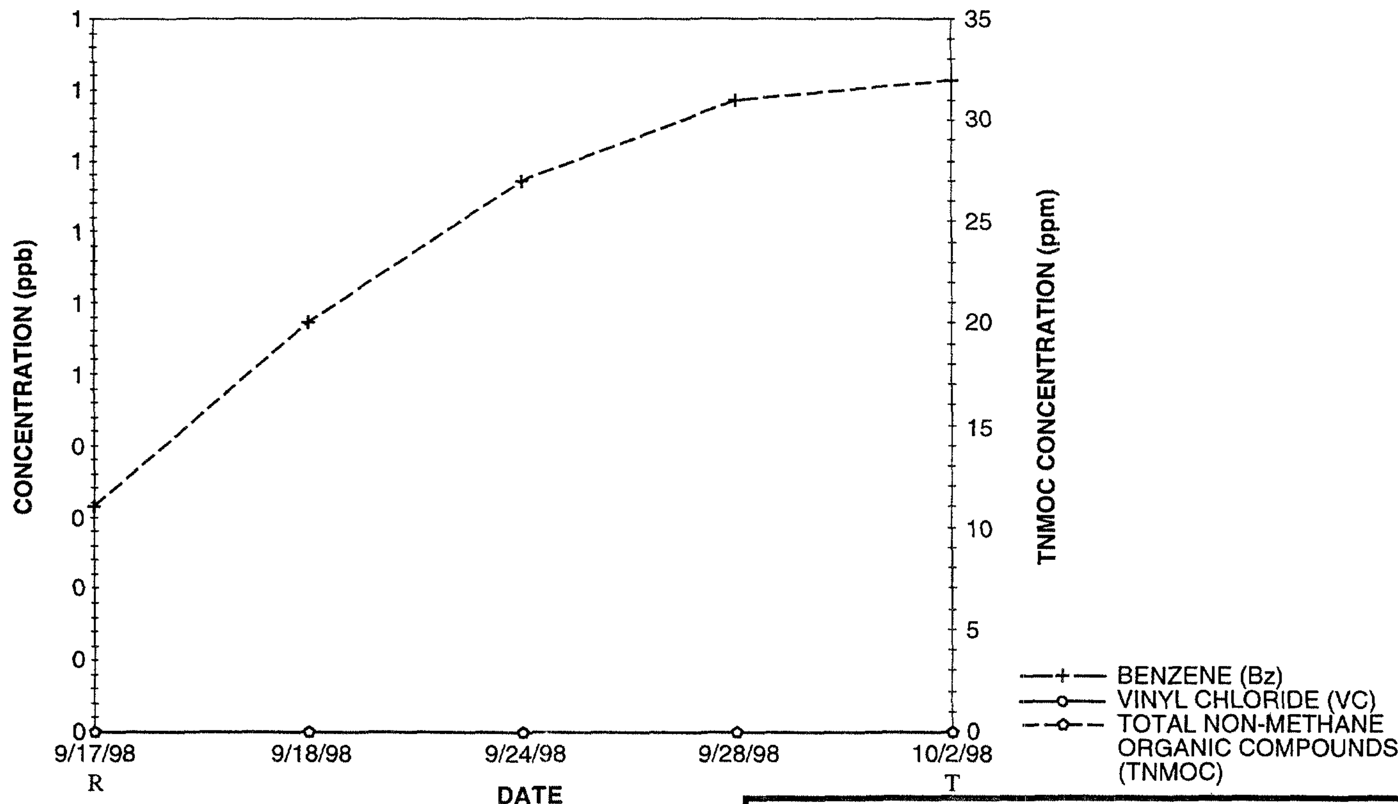
AREA 8 SVE TEST AREA
ZONE OF INFLUENCE
SHALLOW MONITORING WELL
SOIL GAS RESULTS

WASTE DISPLOSAL, INC.
SANTA FE SPRINGS, CALIFORNIA

TRC

FIGURE 3.30





LEGEND

R = RECOVERY MONITORING INITIATED

T = RECOVERY MONITORING TERMINATED AND FIELD MONITORING USING EPA PURGING PROCEDURE INITIATED.

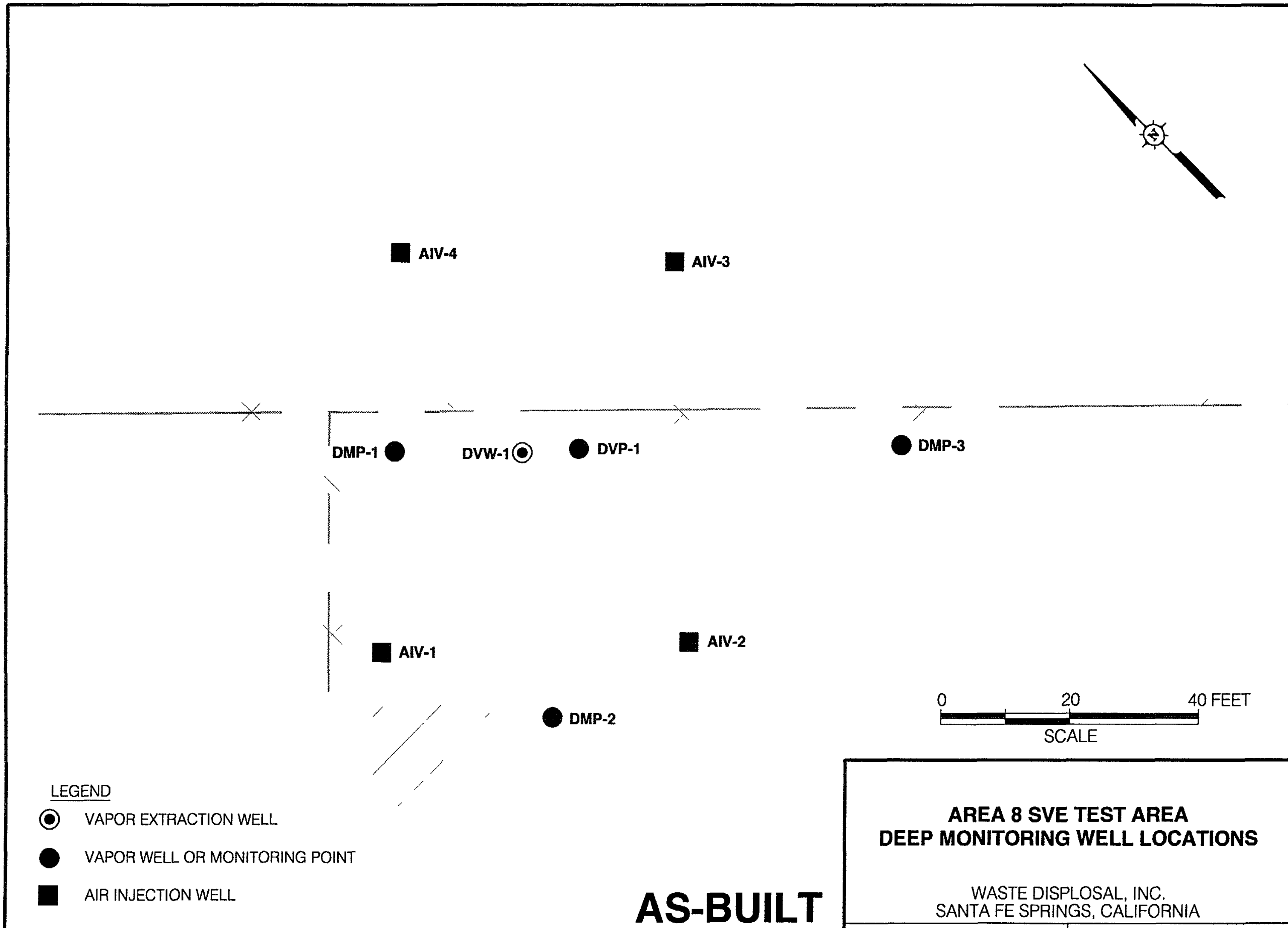
NOTES:
(1) PRIOR TO EPA PURGING PROCEDURE.
(2) EXTRACTION WELL DATA ONLY.

AREA 8 SHALLOW ZONE SVE TESTING LABORATORY RESULTS DURING RECOVERY PERIOD (1)(2)

WASTE DISPOSAL, INC.
SANTA FE SPRINGS, CALIFORNIA

TRC

FIGURE 3.31



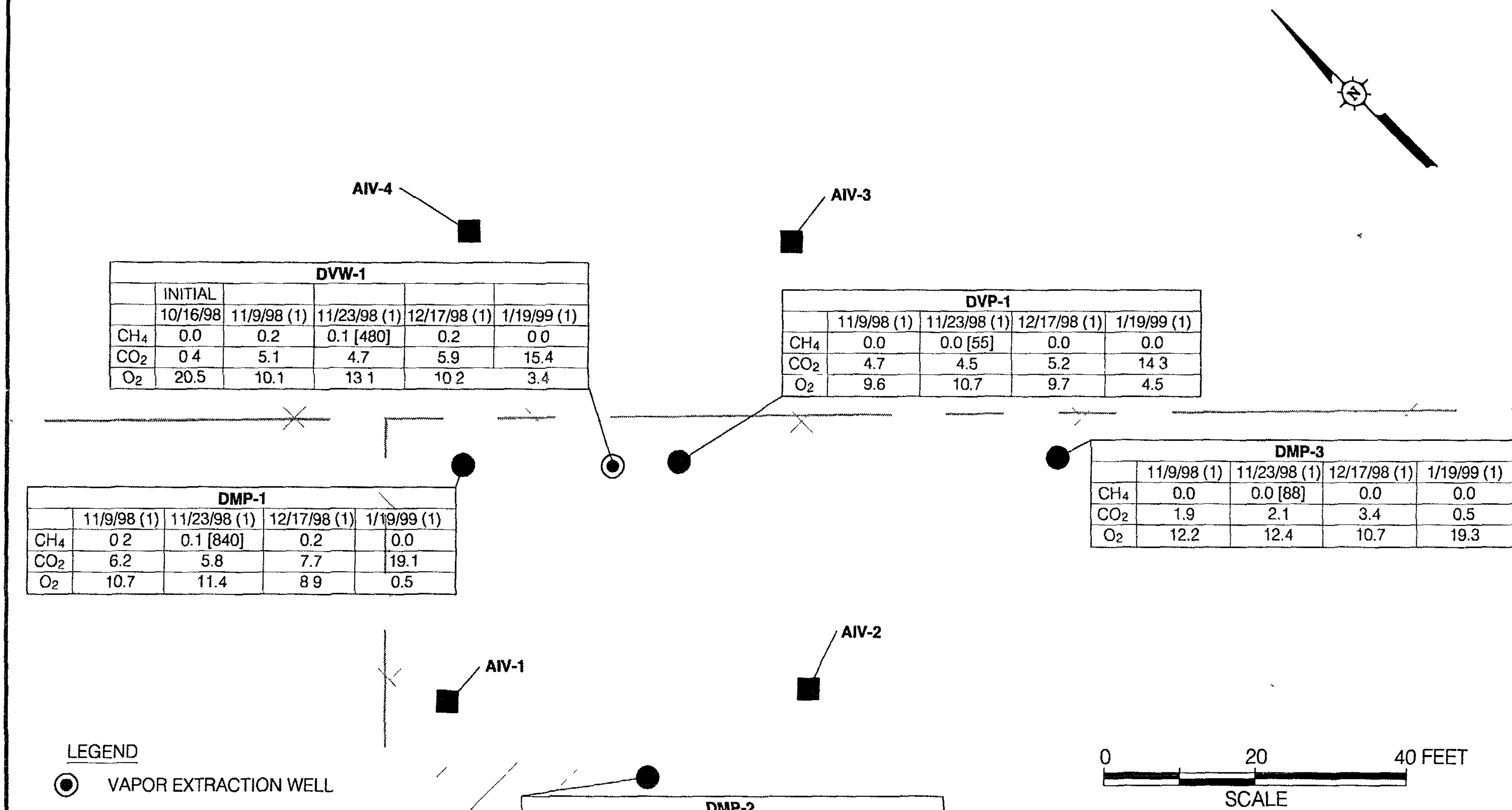
REFERENCE NUNEZ ENGINEERING, SURVEY DRAWING NE 97187, OCT. 31, 1997

AREA 8 SVE TEST AREA
DEEP MONITORING WELL LOCATIONS

WASTE DISPLOSAL, INC.
SANTA FE SPRINGS, CALIFORNIA

TRC

FIGURE 3.32



DVW-1					
	INITIAL 10/16/98	11/9/98 (1)	11/23/98 (1)	12/17/98 (1)	1/19/99 (1)
CH_4	0.0	0.2	0.1 [480]	0.2	0 0
CO_2	0 4	5.1	4.7	5.9	15.4
O_2	20.5	10.1	13 1	10 2	3.4

DVP-1				
	11/9/98 (1)	11/23/98 (1)	12/17/98 (1)	1/19/99 (1)
CH_4	0.0	0.0 [55]	0.0	0.0
CO_2	4.7	4.5	5.2	14 3
O_2	9.6	10.7	9.7	4.5

DMP-3				
	11/9/98 (1)	11/23/98 (1)	12/17/98 (1)	1/19/99 (1)
CH_4	0.0	0.0 [88]	0.0	0.0
CO_2	1.9	2.1	3.4	0.5
O_2	12.2	12.4	10.7	19.3

DMP-1				
	11/9/98 (1)	11/23/98 (1)	12/17/98 (1)	1/19/99 (1)
CH_4	0 2	0.1 [840]	0.2	0.0
CO_2	6.2	5.8	7.7	19.1
O_2	10.7	11.4	8 9	0.5

DMP-2				
	11/9/98 (1)	11/23/98 (1)	12/17/98 (1)	1/19/99 (1)
CH_4	0.0	0.0 [55]	0 0	0.0
CO_2	1.7	1.7	2.2	2.9
O_2	12.1	12.4	10.7	16.6

LEGEND

◉ VAPOR EXTRACTION WELL

● VAPOR WELL OR MONITORING POINT

■ AIR INJECTION WELL

(1) RESULTS OBTAINED BY VACUUM PURGING ONE TO TWO WELL VOLUMES.

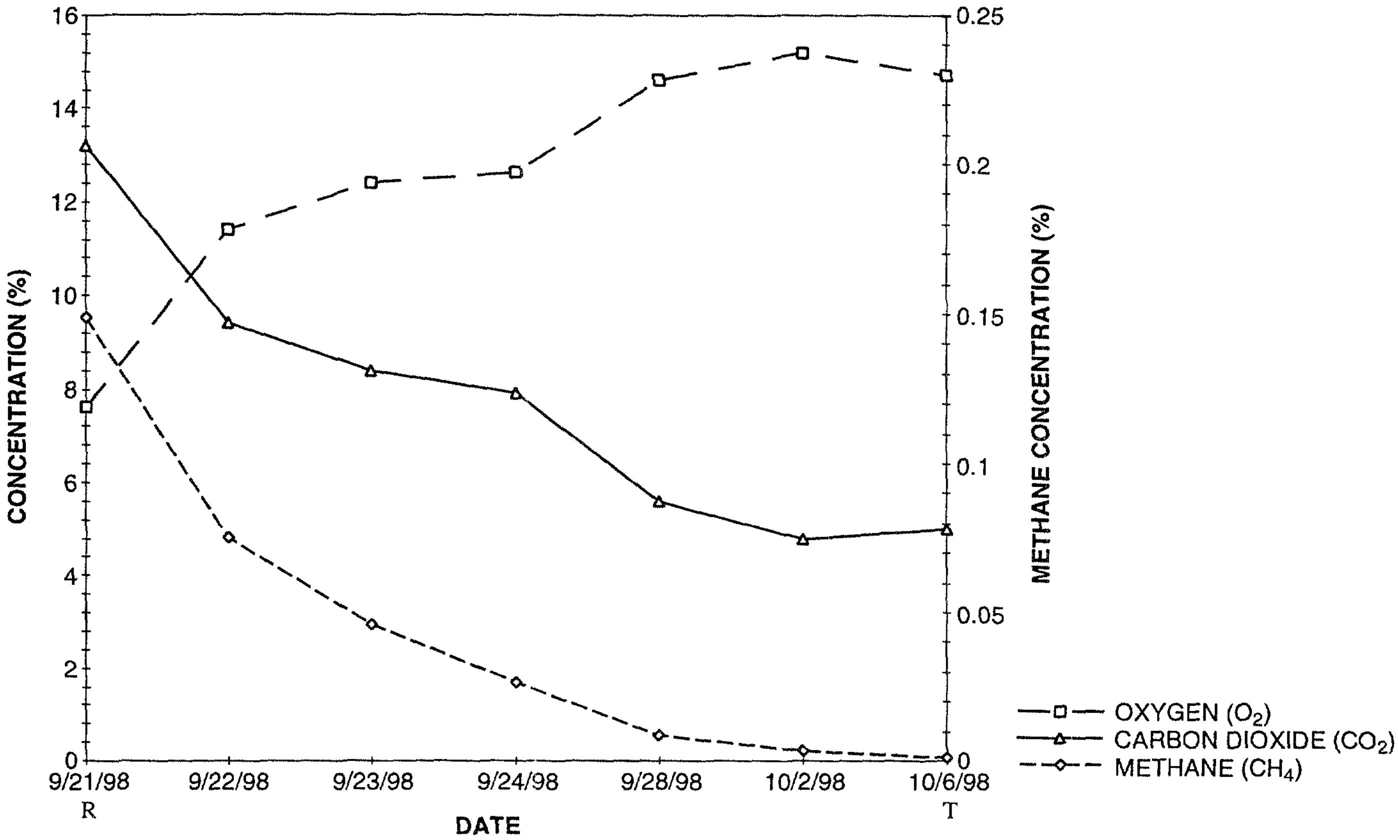
NOTE:
INITIAL READINGS WERE COLLECTED PRIOR TO SVE TREATMENT.
CH_4, CO_2, AND O_2, READINGS ARE RECORDED AS PERCENT CONCENTRATIONS.

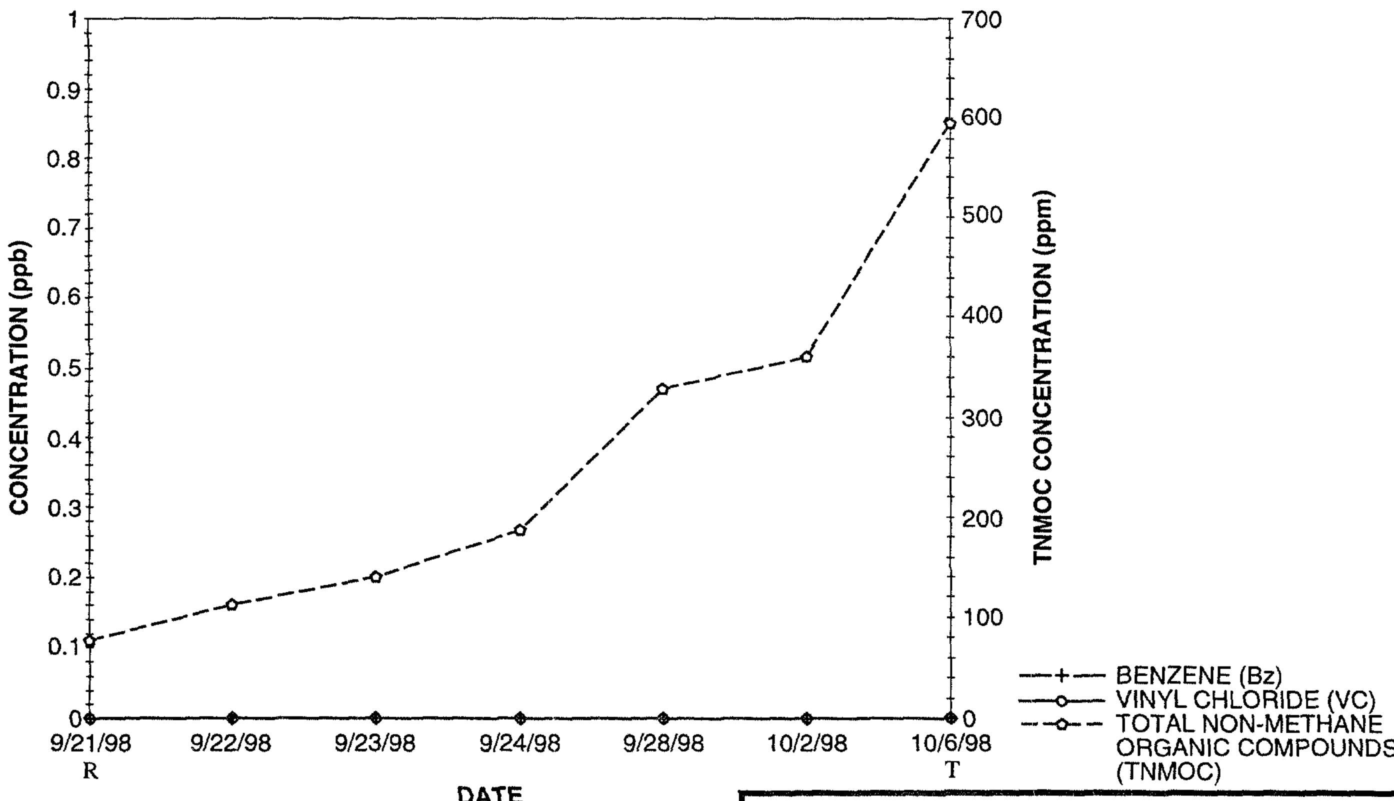
AREA 8 SVE TEST AREA ZONE OF INFLUENCE DEEP MONITORING WELL SOIL GAS RESULTS

WASTE DISPLOSAL, INC.
SANTA FE SPRINGS, CALIFORNIA

TRC

FIGURE 3.33





LEGEND

R = RECOVERY MONITORING INITIATED

T = RECOVERY MONITORING TERMINATED AND FIELD MONITORING USING EPA PURGING PROCEDURE INITIATED.

NOTE:
(1) EXTRACTION WELL DATA ONLY

AREA 8 DEEP ZONE SVE TESTING LABORATORY RESULTS DURING RECOVERY PERIOD [(1)]

WASTE DISPOSAL, INC.
SANTA FE SPRINGS, CALIFORNIA

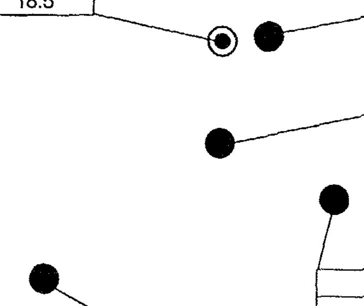
TRC

FIGURE 3.34

94-256TM9AROF-68 REV 02/23/99

SVW-1					
	INITIAL				
	9/23/98	11/9/98 (1)	11/23/98 (1)	12/17/98 (1)	1/20/99 (1)
CH_4	0.05	0.0	0.0	0.0	0.1
CO_2	4.7	1.9	2.2	2.7	1.3
O_2	10.3	13.4	14.4	12.3	18.5

SVP-1					
	INITIAL				
	9/23/98	11/9/98 (1)	11/23/98 (1)	12/17/98 (1)	1/20/99 (1)
CH_4	--	0.0	0.0	0.0	17.2
CO_2	--	3.6	3.4	3.8	5.5
O_2	--	12.7	13.2	11.9	0.0



SMP-1					
	INITIAL				
	9/23/98	11/9/98 (1)	11/23/98 (1)	12/17/98 (1)	1/20/99 (1)
CH_4	--	0.0	0.0	0.0	30.8
CO_2	--	2.5	2.4	2.8	1.8
O_2	--	14.4	14.1	14.0	0.0

SMP-2					
	INITIAL				
	9/23/98	11/9/98 (1)	11/23/98 (1)	12/17/98 (1)	1/20/99 (1)
CH_4	--	0.0	0.0	0.0	28.3
CO_2	--	2.8	2.7	2.9	1.0
O_2	--	12.7	13.1	10.7	0.0

SMP-3					
	INITIAL				
	9/23/98	11/9/98 (1)	11/23/98 (1)	12/17/98 (1)	1/20/99 (1)
CH_4	--	0.0	0.0	0.0	12.9
CO_2	--	3.0	2.8	3.1	8.2
O_2	--	13.2	12.9	11.7	0.0

0 20 40 FEET

SCALE

LEGEND

VAPOR EXTRACTION WELL

VAPOR WELL OR MONITORING POINT

(1) RESULTS OBTAINED BY VACUUM PURGING ONE OR TWO WELL VOLUMES.

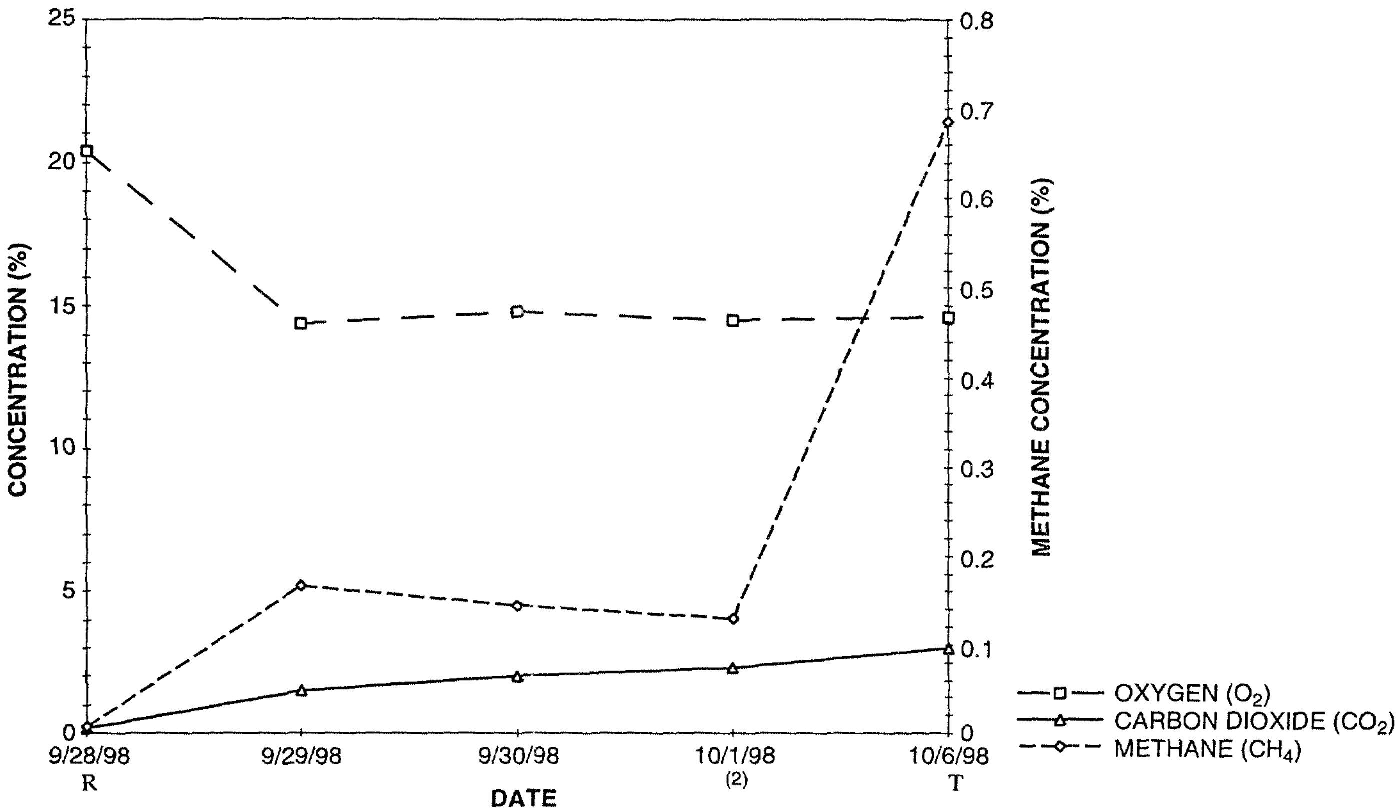
NOTE:
INITIAL READINGS WERE COLLECTED PRIOR TO SVE TREATMENT.
CH_4, CO_2, AND O_2 READINGS ARE RECORDED AS PERCENT CONCENTRATIONS.
SVE WELLS ARE LOCATED WITHIN FOOTPRINT OF THE SUMP-LIKE MATERIAL. REFER TO FIGURE 2.1.

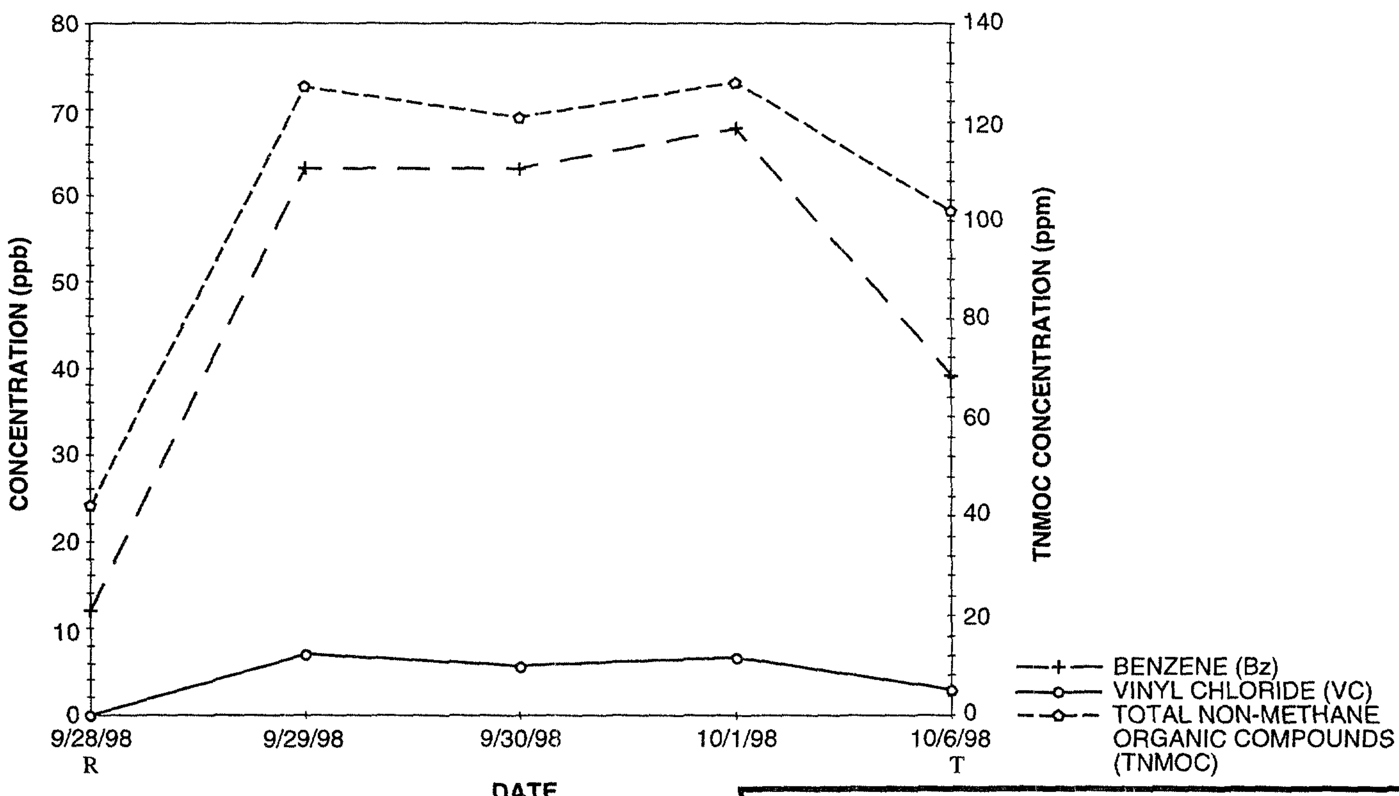
**RV STORAGE SVE TEST AREA
ZONE OF INFLUENCE
SHALLOW MONITORING WELL
SOIL GAS RESULTS**

WASTE DISPLOSAL, INC.
SANTA FE SPRINGS, CALIFORNIA

TRC

FIGURE 3.35





LEGEND

R = RECOVERY MONITORING INITIATED

T = RECOVERY MONITORING TERMINATED AND FIELD MONITORING USING EPA PURGING PROCEDURE INITIATED.

NOTES:
(1) PRIOR TO EPA PURGING PROCEDURE
(2) METHANE LEVELS APPEAR TO INCREASE ALTHOUGH O_2 IS RELATIVELY HIGH.
(3) EXTRACTION WELL DATA ONLY.

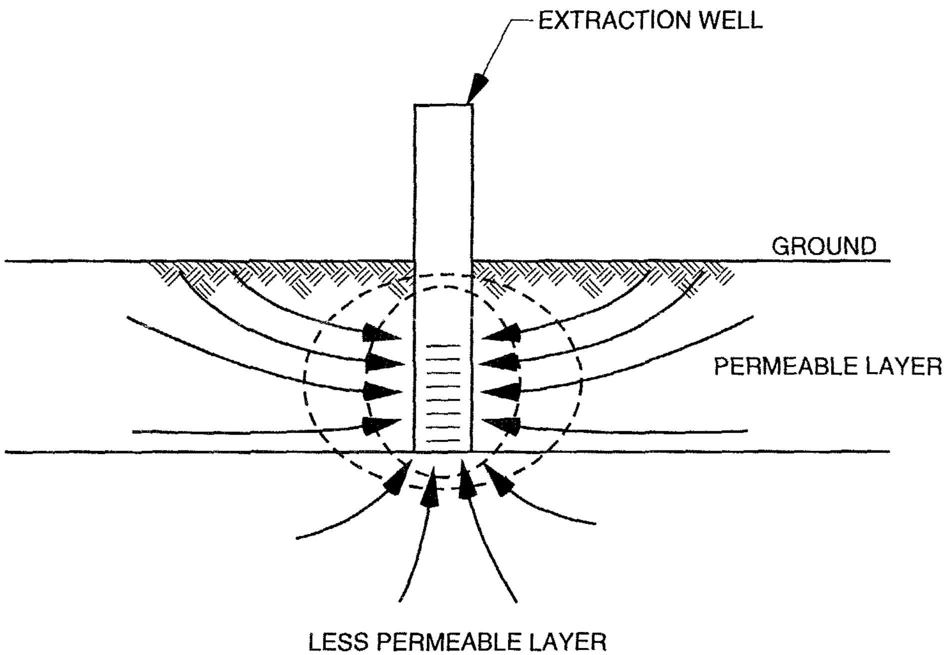
RV SHALLOW ZONE SVE TESTING LABORATORY RESULTS DURING RECOVERY PERIOD(1)(3)

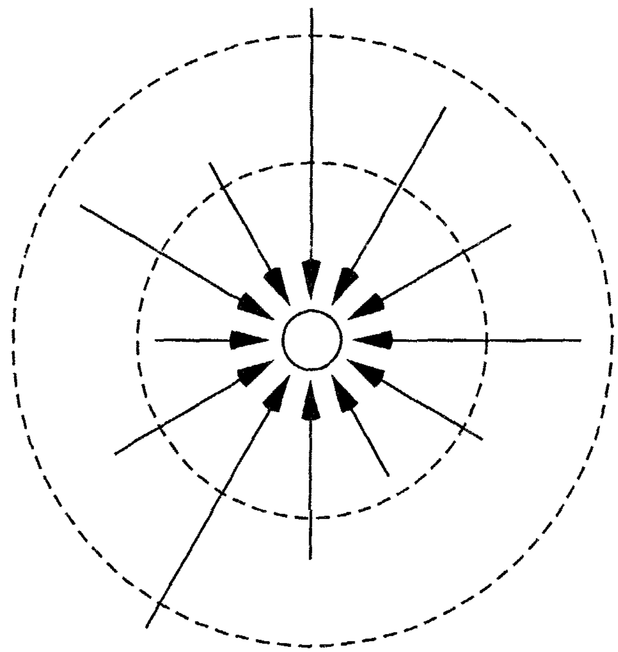
WASTE DISPOSAL, INC.
SANTA FE SPRINGS, CALIFORNIA

TRC

FIGURE 3.36

94-256TM9AROF-79 REV 02/22/99



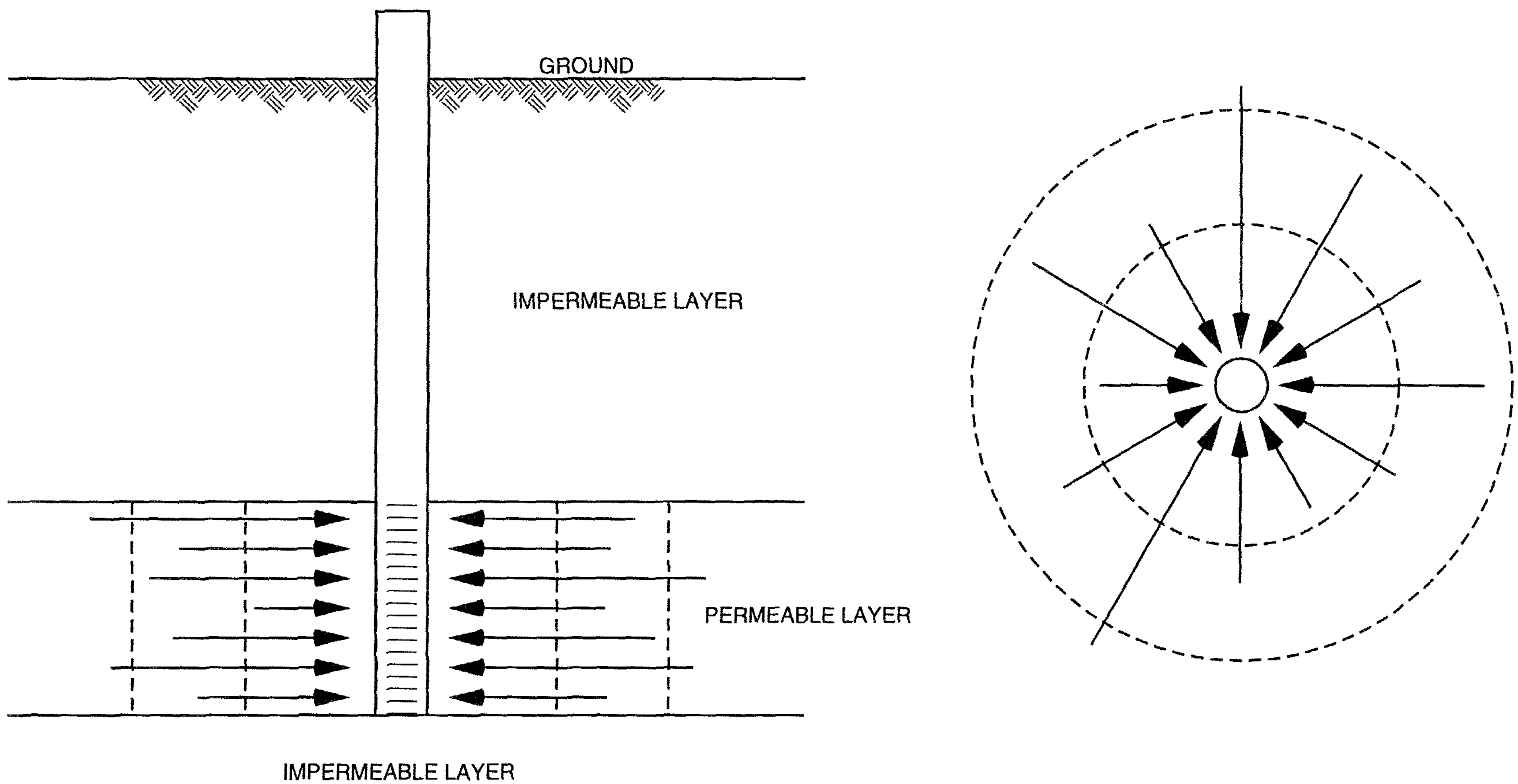


FLOW PATTERN FOR SHALLOW SVE LAYER

WASTE DISPOSAL, INC.
SANTA FE SPRINGS, CALIFORNIA

TRC

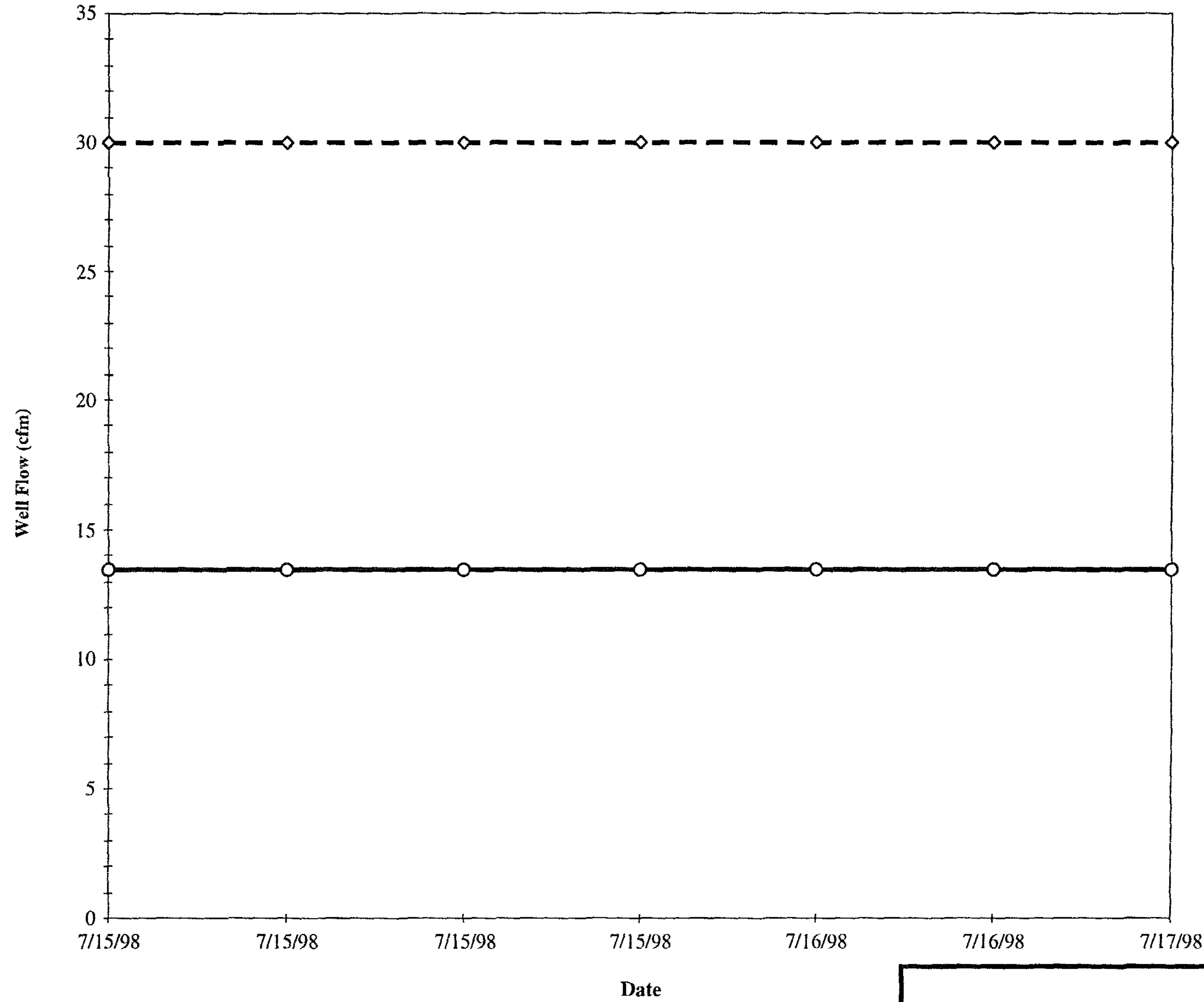
FIGURE 4.1



FLOW PATTERN FOR SVE LAYER SURROUNDED BY IMPERMEABLE LAYERS

WASTE DISPOSAL, INC.
SANTA FE SPRINGS, CALIFORNIA

TRC | FIGURE 4.2



LEGEND

Well Flow

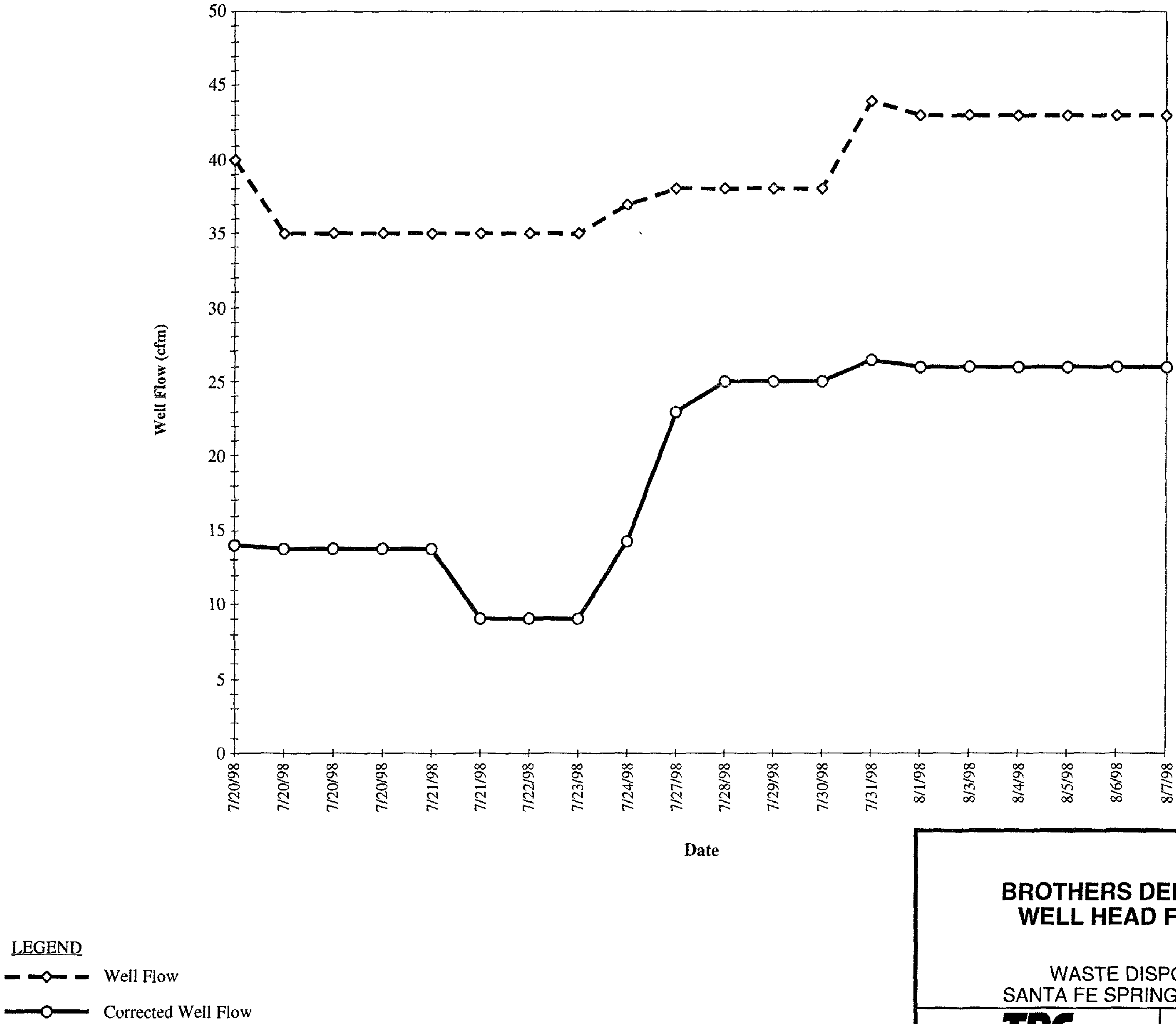
Corrected Well Flow

BROTHERS SHALLOW SVE TEST
WELL HEAD FLOW (CFM)

WASTE DISPOSAL, INC.
SANTA FE SPRINGS, CALIFORNIA

TRC

FIGURE 4.3

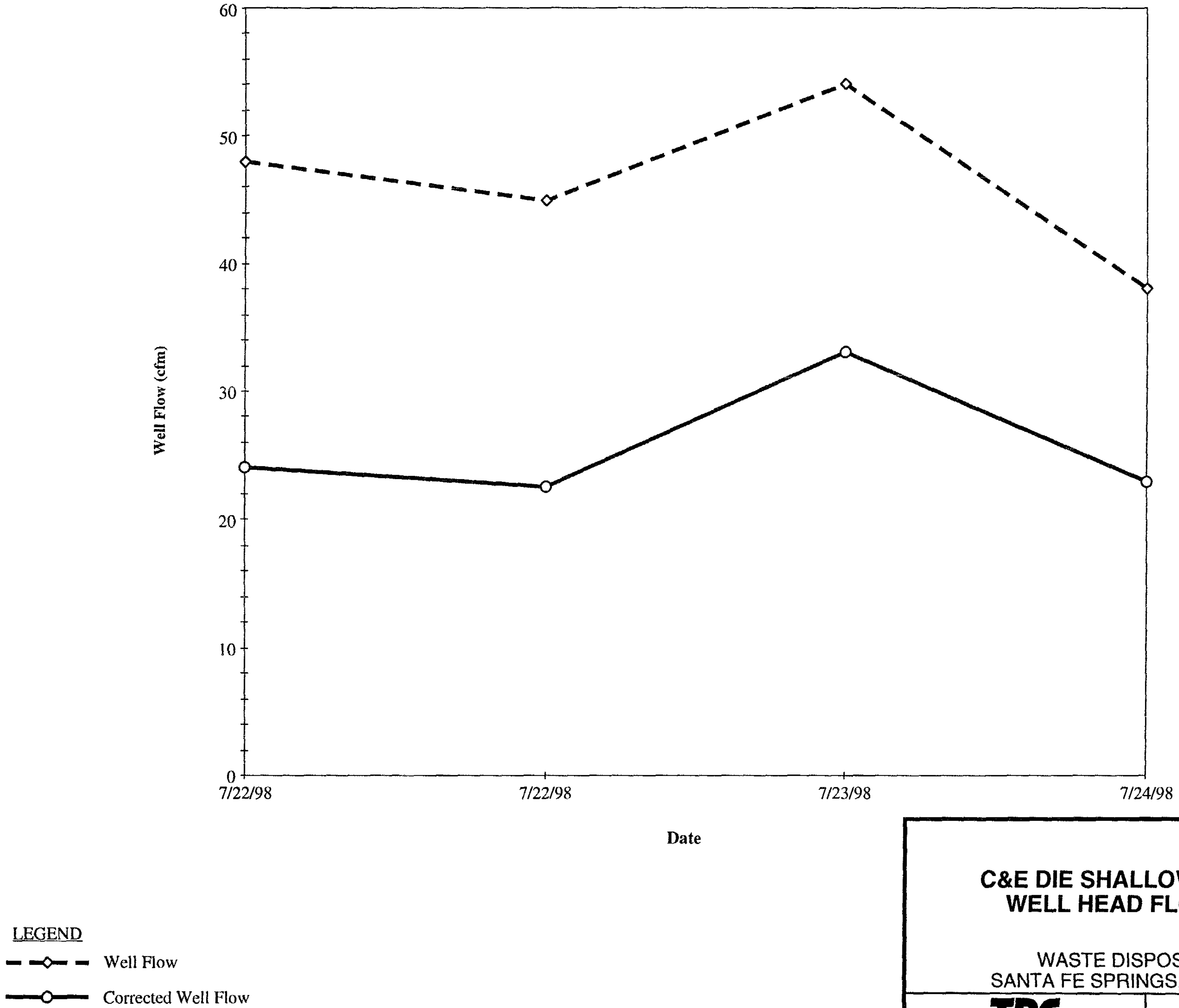


BROTHERS DEEP SVE TEST
WELL HEAD FLOW (CFM)

WASTE DISPOSAL, INC.
SANTA FE SPRINGS, CALIFORNIA

TRC

FIGURE 4.4

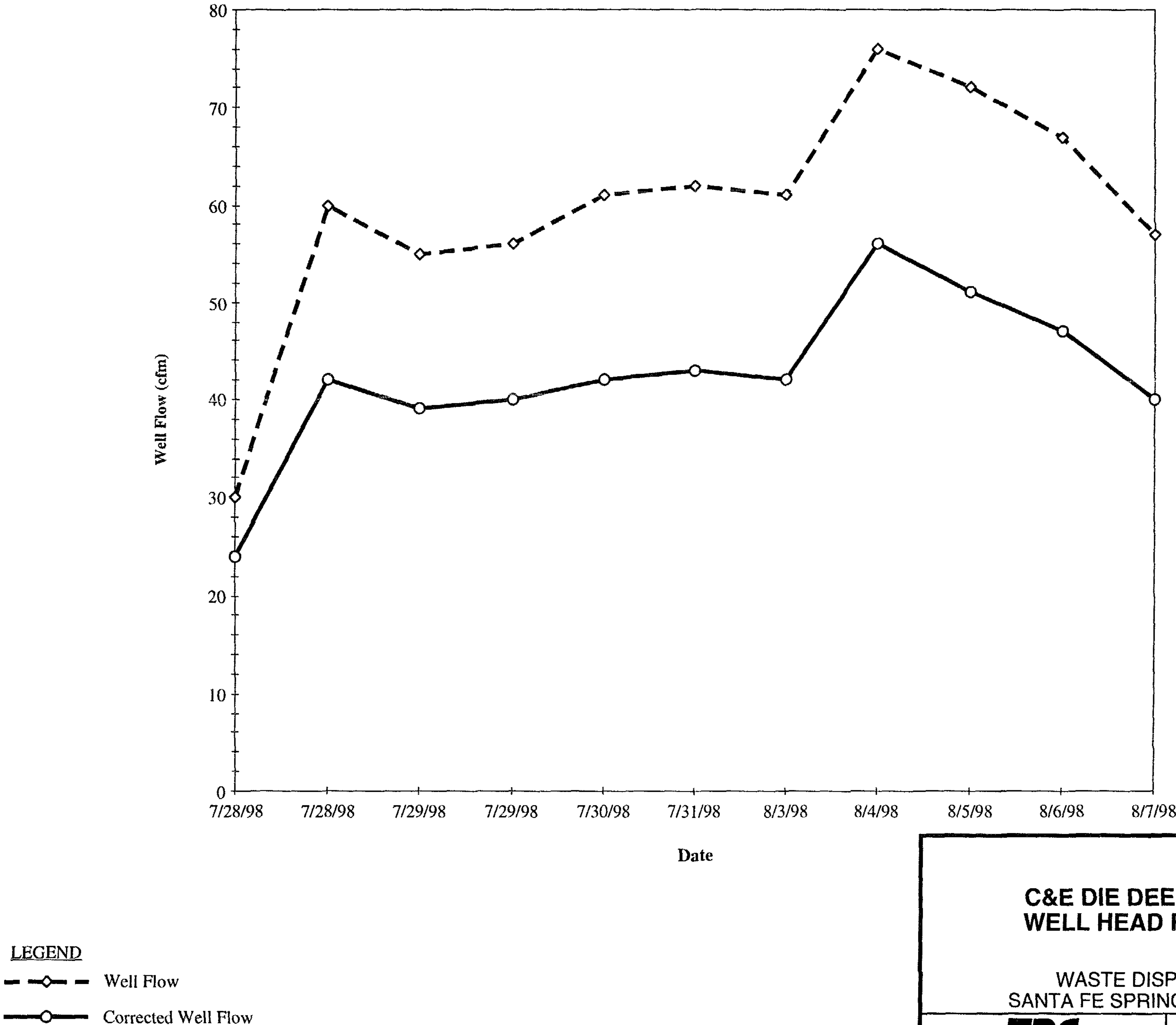


C&E DIE SHALLOW SVE TEST
WELL HEAD FLOW (CFM)

WASTE DISPOSAL, INC.
SANTA FE SPRINGS, CALIFORNIA

TRC

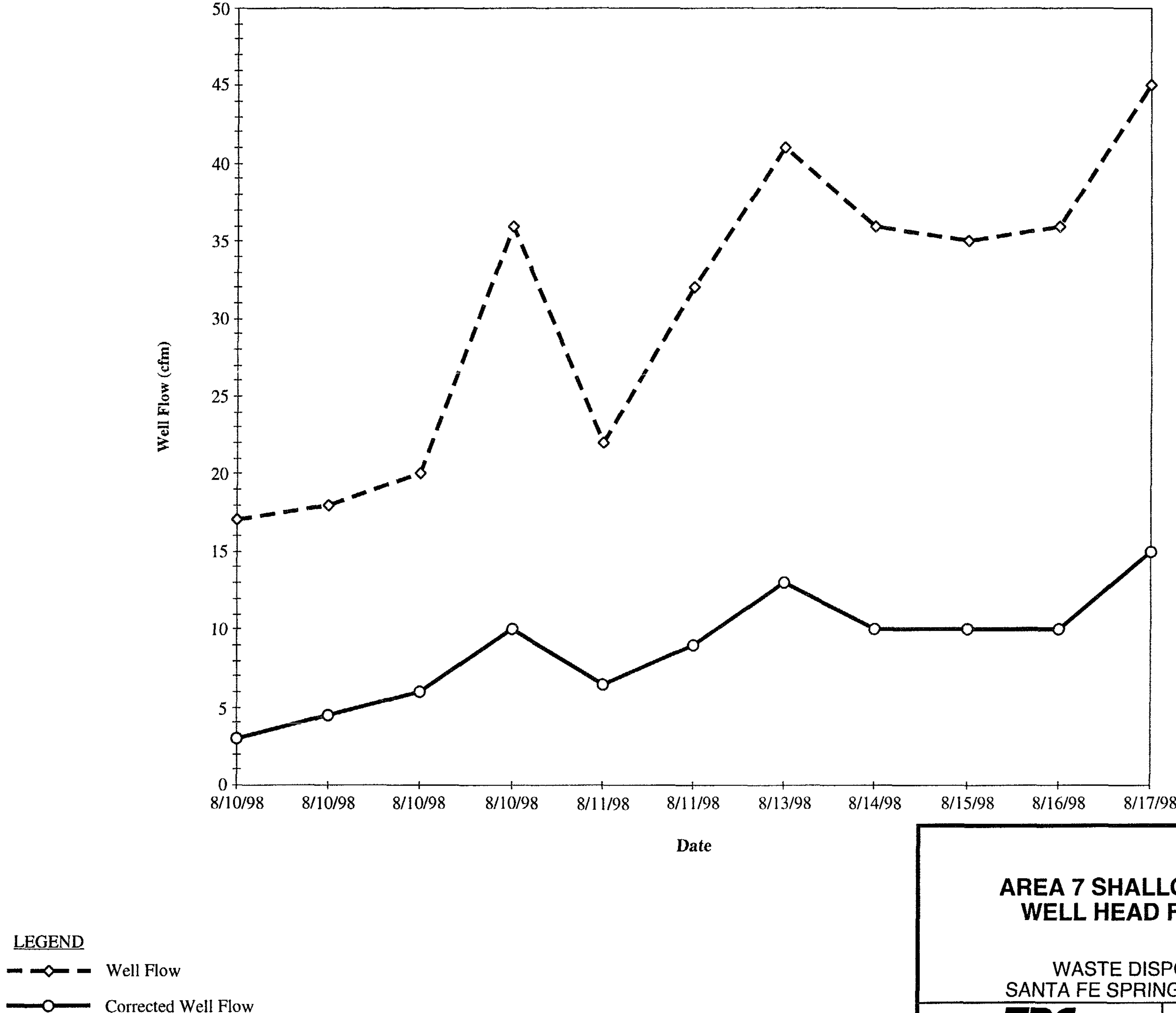
FIGURE 4.5



C&E DIE DEEP SVE TEST
WELL HEAD FLOW (CFM)

WASTE DISPOSAL, INC.
SANTA FE SPRINGS, CALIFORNIA

TRC | **FIGURE 4.6**

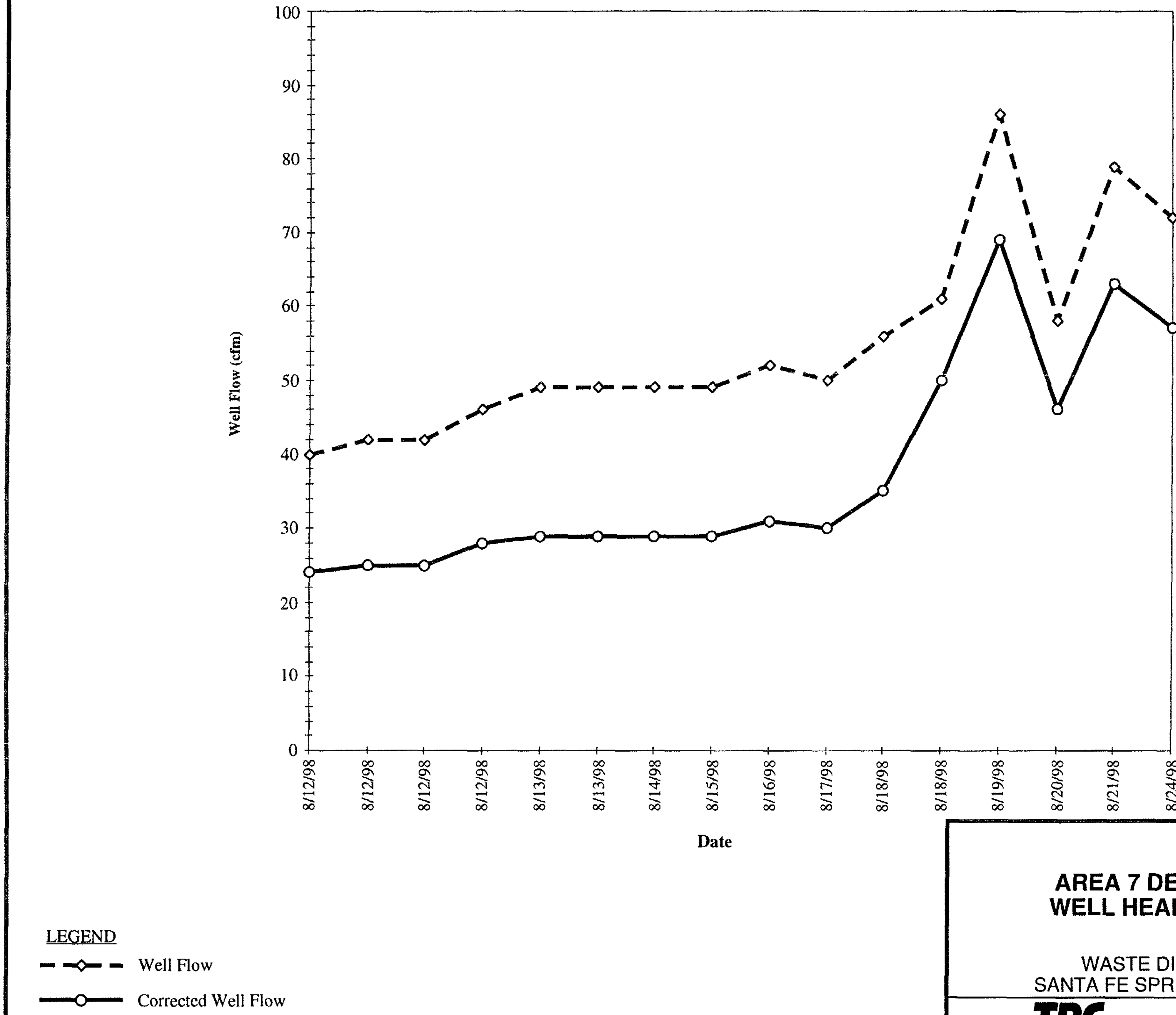


AREA 7 SHALLOW SVE TEST
WELL HEAD FLOW (CFM)

WASTE DISPOSAL, INC.
SANTA FE SPRINGS, CALIFORNIA

TRC

FIGURE 4.7

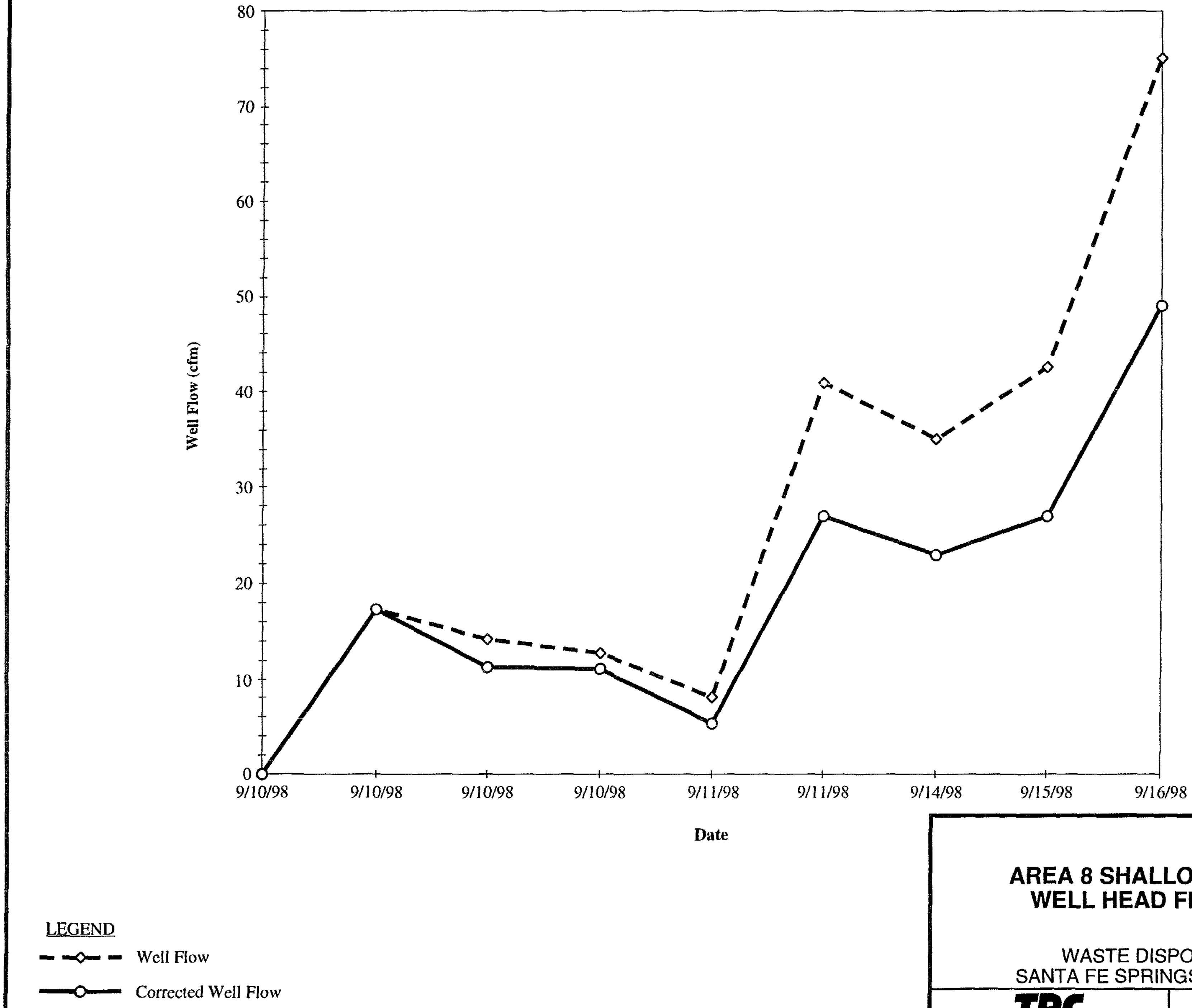


AREA 7 DEEP SVE TEST
WELL HEAD FLOW (CFM)

WASTE DISPOSAL, INC.
SANTA FE SPRINGS, CALIFORNIA

TRC

FIGURE 4.8



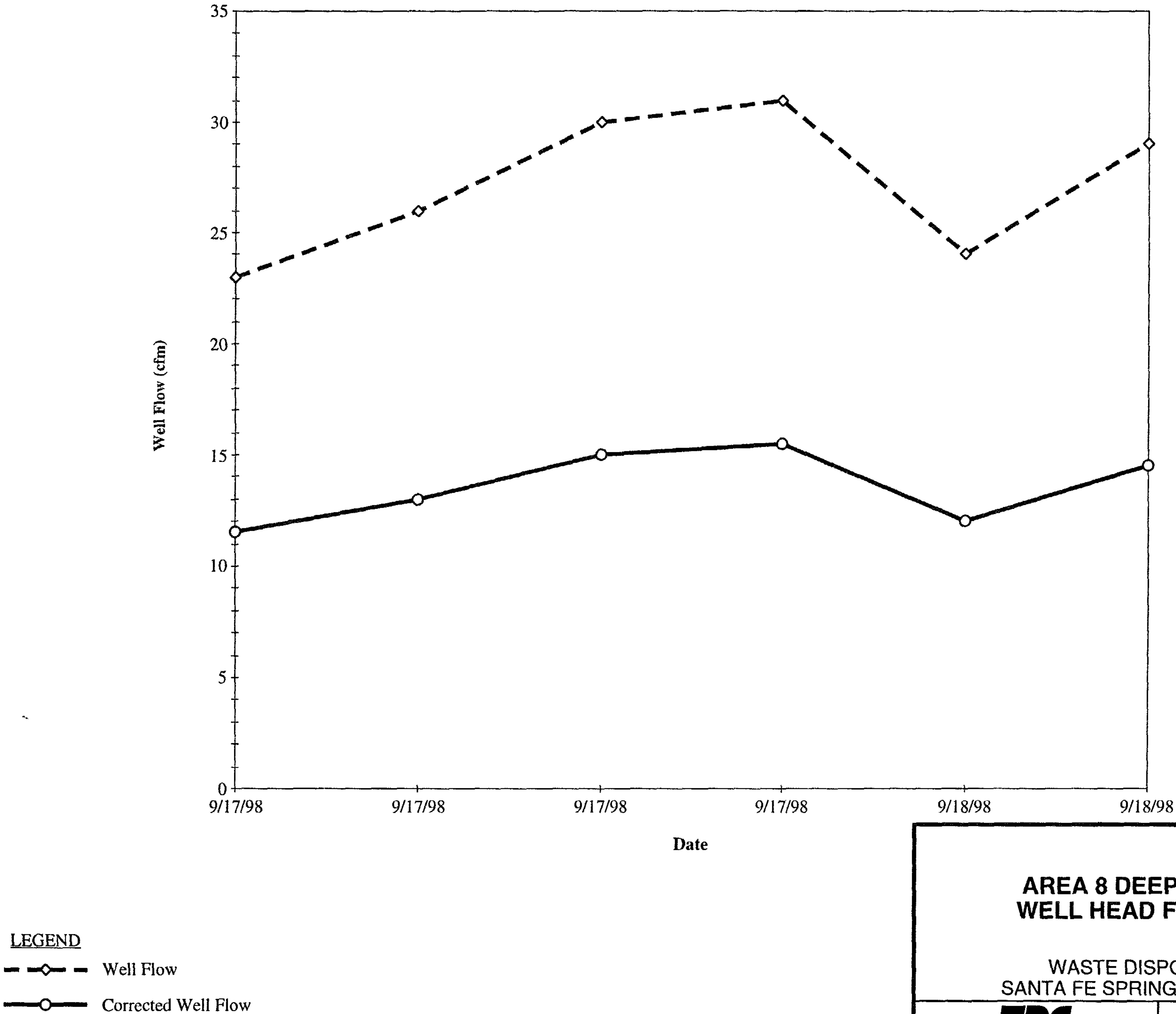
AREA 8 SHALLOW SVE TEST
WELL HEAD FLOW (CFM)

WASTE DISPOSAL, INC.
SANTA FE SPRINGS, CALIFORNIA

TRC

FIGURE 4.9

94-256TM9AROF-87 REV.02/25/99

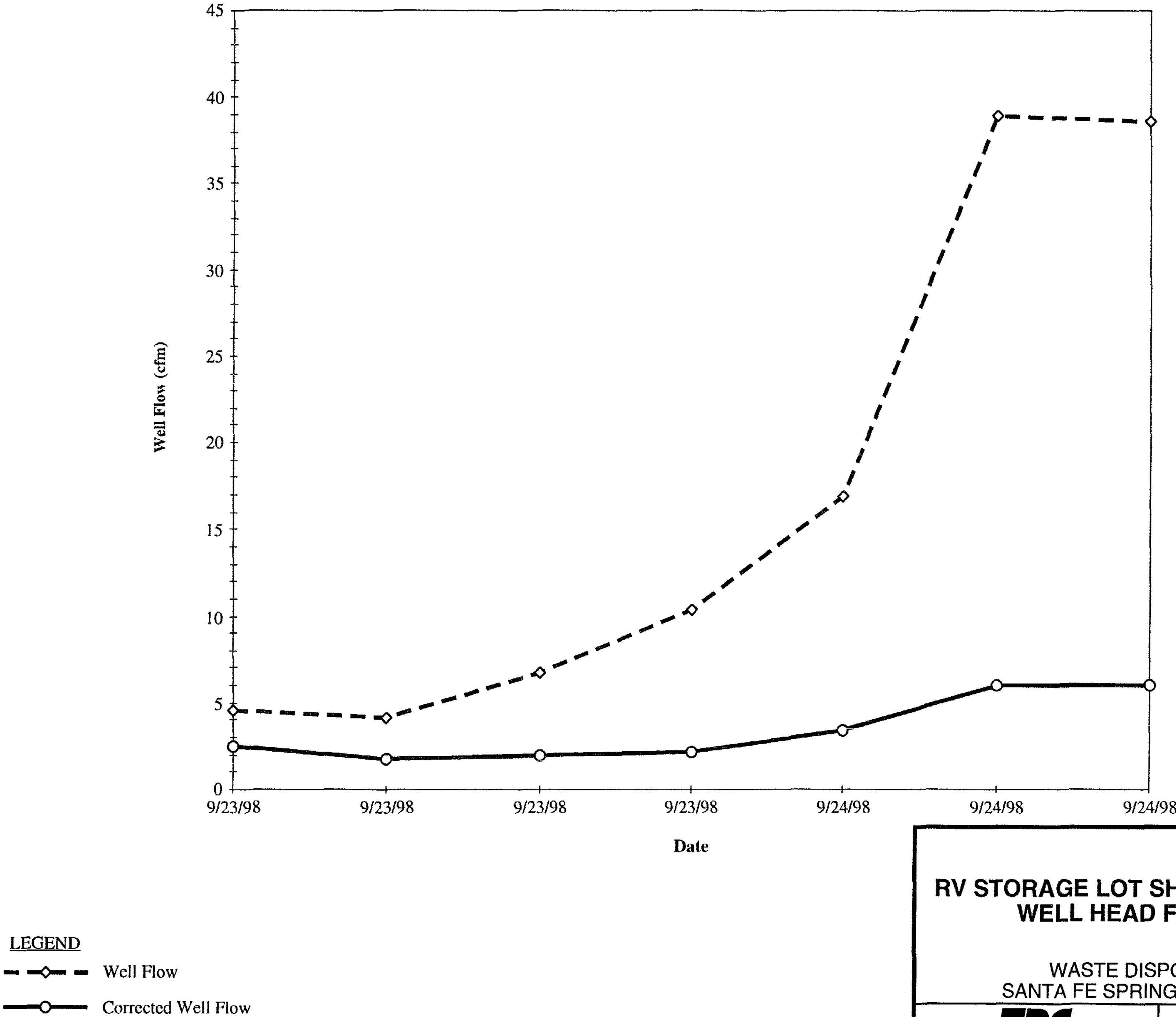


AREA 8 DEEP SVE TEST
WELL HEAD FLOW (CFM)

WASTE DISPOSAL, INC.
SANTA FE SPRINGS, CALIFORNIA

TRC

FIGURE 4.10



RV STORAGE LOT SHALLOW SVE TEST
WELL HEAD FLOW (CFM)

WASTE DISPOSAL, INC.
SANTA FE SPRINGS, CALIFORNIA

TRC | **FIGURE 4.11**

APPENDIX A

BORING LOGS AND WELL CONSTRUCTION DIAGRAMS

APPENDIX B

LABORATORY DATA

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APPENDIX C

ZONE OF INFLUENCE CALCULATIONS

TRC

APPENDIX D

INTRINSIC PERMEABILITY CALCULATIONS

TRC

APPENDIX E

SUMMARY OF GASSOLVE MODELING RESULTS

APPENDIX F

DETAILED GASSOLVE MODELING RESULTS

TRC

APPENDIX G

SITE GAS GENERATION CALCULATIONS

TRC

APPENDIX H

DESTRUCTIVE EFFICIENCY CALCULATIONS

TRC